



EDITORIAL COMMENT

The right ventricle in advanced heart failure: The dark side of the moon



O ventrículo direito na insuficiência cardíaca avançada: o lado escuro da Lua

Mariana Brandão, Daniel Caeiro*

Serviço de Cardiologia, Centro Hospitalar de Vila Nova de Gaia/Espinho, Vila Nova de Gaia, Portugal

Heart failure (HF) is a leading cause of death and hospitalization, imposing a heavy burden, not only on patients and their families, but also on society.^{1,2} In recent years, various advances, including new drugs, cutting-edge devices and innovative therapeutic strategies, have improved the longevity and quality of life of HF patients.^{1,2} Unfortunately, though, not all patients derive the maximum benefit from such approaches, and many do not exhibit a favorable clinical response. Inability to tolerate drug treatment, or merely an unsatisfactory response to interventions, are among the factors that result in an unsuccessful path in chronic HF.^{2,3} HF patients frequently require medical attention, with regular visits to emergency departments and hospital admissions, often in high-dependency units. Such events are well-recognized predictors of mortality.^{2,3} Identifying high-risk patients solely on clinical grounds is often a hard and inglorious task. This has prompted a search for biochemical and imaging parameters to aid clinical assessment and the identification of patients at higher risk for adverse events and death.⁴ Left ventricular ejection fraction (LVEF) is a long-time favorite and extensively evaluated tool¹ that is a good prognostic marker in HF patients. It is widely available, easily obtainable and (relatively) reproducible. However, in patients with more severe ventricular dysfunction, it loses its ability to predict events. Of note, in

many patients, LVEF does not correlate well with functional capacity or quality of life.³

The measurement of right ventricular (RV) function, historically overshadowed by its left counterpart, is often metaphorically compared to the dark side of the moon: less accessible and often disregarded. Currently, there is growing interest in the pathophysiologic role and prognostic relevance of the right ventricle in advanced HF. However, objective, reliable, and reproducible assessment of RV function is often difficult. Several methods have been advocated, but all are far from perfect, and this constitutes an important limitation to the use of RV functional parameters in daily clinical practice.⁵ In their article⁶ published in this issue of the *Journal*, Ozenc and coworkers explore the role of data obtained from right heart catheterization as a tool to assess a group of more severe patients, candidates for heart transplantation or left ventricular assist device (LVAD) implantation, most of them under optimal medical therapy as recommended by the ESC guidelines on Heart Failure from 2012.¹

As expected, a comprehensive data collection was performed. After non-invasive assessment by echocardiography and right heart catheterization, the only parameter that strongly predicted hospitalization was right ventricular stroke work index (RVSWI). Other commonly used non-invasive and hemodynamic parameters, such as LVEF, tricuspid annular plane systolic excursion, cardiac index or cardiac output, and pulmonary capillary wedge pressure (PCWP), did not have predictive value regarding HF hos-

* Corresponding author.

E-mail address: danicaeiro@hotmail.com (D. Caeiro).

pitalizations. Moreover, none of the tools analyzed were found to predict mortality. The authors attributed this to the short follow-up time. The relatively low cardiovascular mortality (considering the high-risk features of this group of patients), more easily influenced by unexpected events or even arrhythmic episodes, may be another plausible explanation for the absence of significant predictors. Unfortunately no information was reported regarding implantable cardioverter-defibrillator use.

Notably, deceased patients displayed numerically lower cardiac output and index, as well as higher PCWP. Nonetheless, such differences were not statistically significant (probably due to the low event rate).

Right heart catheterization is an invasive procedure with non-negligible complications. Furthermore, it is not widely available and should be performed only in selected cases, by experienced operators. However, it remains part of the routine assessment of heart transplantation or LVAD candidates. The work by Ozenc et al. showed that measurement of RVSWI provides further valuable information in settings where right heart catheterization is required, without significantly increasing the complexity or risk of the procedure.

Advanced HF involves complex clinical scenarios in which a 'one size fits all' assessment and management of patients is unlikely to result in satisfactory outcomes. The information added by RVSWI may enable more tailored management and follow-up in this particular setting, identifying patients who are at higher risk for unscheduled hospital admissions and in need of closer surveillance or anticipated advanced interventions. It might also prompt earlier referral for palliative care (often disregarded, but important to patients from their individual perspective).

Curiously, none of the enrolled patients underwent cardiac transplantation and no information regarding LVAD support is provided. It is possible that the authors, similarly to Portuguese heart failure specialists, face a harsh reality when it comes to access to heart transplantation and medium- and long-term LVAD therapy. Unfortunately, heart transplantation is becoming more and more an epidemiological curiosity and access to LVAD, shamefully, a mirage.⁷

Treatment optimization in advanced heart failure is an ever-moving target: when acute HF stabilization is achieved, further down the road the same patient may return in a challenging chronic HF scenario, with an increased burden of age and comorbidities. However, meanwhile, providing our patients with the optimum strategy according to current best practice enables them to live a longer and happier life, and that is undoubtedly a great achievement for heart failure caregivers.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

1. Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J*. 2016;37:2129–200.
2. Roger V. Epidemiology of heart failure. *Circ Res*. 2013;113:646–59.
3. Vasan RS, Xanthakis V, Lyass A, et al. Epidemiology of left ventricular systolic dysfunction and heart failure in the Framingham Study: an echocardiographic study over three decades. *J Am Coll Cardiol Image*. 2018;11:1–11.
4. Canepa M, Fonseca C, Chioncel O, et al. Performance of prognostic risk scores in chronic heart failure patients enrolled in the European Society of Cardiology Heart Failure Long-Term Registry. *J Am Coll Cardiol HF*. 2018;6:452–62.
5. Sciacaluga C. Traditional and novel imaging of right ventricular function in patients with heart failure and reduced ejection fraction. *Curr Heart Fail Rep*. 2020;17:28–33.
6. Ozenc E, Yildiz O, Baydar O, et al. Impact of right ventricular stroke work index on predicting hospital readmission and functional status of patients with advanced heart failure. *Rev Port Cardiol*. 2020;39, <http://dx.doi.org/10.1016/j.repc.2020.06.014>.
7. IPST. Doação e Transplantação de Órgãos. Relatório online da Atividade Nacional; Janeiro-Setembro 2019.