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EDITORIAL

# Hepatic Elastography in the Assessment of Heart Failure: Where We Came from and Where We Are Going

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Congestive heart failure (HF) is the end stage for many cardiac diseases. It is associated with high mortality and high hospital readmission rates, despite advances in pharmacological (sacubitril-losartan, beta-blockers and renin-angiotensin system inhibitors) and non-pharmacological (defibrillators and resynchronizers) treatment.

Therefore, it is natural that clinicians are interested in the improvement of diagnostic methods and efficient prognostic markers capable of identifying patients at higher risk, thus anticipating complications and providing treatment guidance.

We cardiologists have long recognized biventricular dysfunction as a more severe and advanced form of HF, and brain natriuretic peptide (BNP) as a biochemical marker, used for both diagnostic and prognostic purposes. However, BNP are not yet widely used in daily clinical practice, probably due to overestimation of clinical parameters for the indication, conduction and determination of the therapy in most services focused on these patients' assistance.

The search for other methods with prognostic and diagnostic value for right ventricular dysfunction remains constant. Nevertheless, these methods must meet the requirements that current tests have failed to achieve: low cost, high specificity and sensitivity, reproducibility and no requirement of high technical knowledge to operate.

Elastography has long been used by hepatologists in the evaluation of liver parenchyma stiffness.[1] This test assesses tissue stiffness using an ultrasound transducer, which measures low-frequency vibrations. There is a direct relationship between the parenchyma stiffness and the propagation of these vibrations registered by the device. The stiffer the hepatic parenchyma, the faster the vibrations are propagated. Often, this stiffness is associated with numerous factors such as fibrosis, inflammation, liver perfusion, fatty infiltration, cholestasis and congestion.

Interestingly, the congestion that interfered in the results of elastography, during the investigation of liver diseases, called cardiologists' attention. It was clear that there was an important correlation between increased liver stiffness and increased venocapillary pressure[2] and also the possibility of using this test to assess right ventricular performance.

Ávila D et al.,[3] in their excellent systematic review, selected 7 studies that compared hepatic elastography (HE) with the results of echocardiography and BNP, in patients with HF. They concluded that the use of this technique seems to improve the diagnostic power of increased right-sided filling cardiac pressures and could assist in the medical management of these patients, adding prognostic value at the moment of hospital discharge. However, they were careful in stating that these are not A definitive result, and further studies are needed for a better understanding of this issue.

Elastography combined with ultrasound is a simple, fast, low-cost and noninvasive test, performed at the bedside. Still, several barriers have yet to be overcome:

Regarding elastography, the method is examiner-dependent. Besides, it requires a device so that the measurements are obtained, and adequate training to mitigate the possibility of measuring errors.

## Keywords

Heart Failure; Elasticity Imaging Techniques/methods; Hospitalization; Outcomes; Patient Readmission; Prognosis; Liver Diseases.

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Patients with liver disease and cirrhosis present higher values in HE compared to patients with cardiac disease. In general, this group was excluded from the studies that aimed at investigating patients with HF in order to avoid confounding factors. Therefore, the assessment of congestion in the presence of underlying liver disease still represents a challenge that must be overcome.

Similarly to most complementary exams, HE requires good clinical correlation, especially because it does not specify the cause of increased stiffness.

Fat tissue attenuates ultrasound wave propagation and, for this reason, obesity can make it difficult to perform the test.[4] Failure or inconsistent results can reach almost 20%. Factors associated with unreliable results include: BMI greater than 30 kg $m^2$, age above 52 years, female sex, inexperienced operator, type 2 diabetes mellitus and ascites. Liver inflammation and steatosis may also reduce the test's accuracy.[5-7]

## Conclusion

There seems to be a consensus that the greater the liver stiffness, the greater the risk of mortality ("Stone liver, heart in danger", according to Pernot and Villemain)[8] However, innumerous studies are necessary to determine which therapeutic interventions would be capable of decreasing that stiffness and whether such decrease would have a consistent impact on prognosis. Another relevant data is that we do not know exactly the amount of information that HE can add to clinical practice, in addition to the information already provided by echocardiography and BNP.

It is believed that a long way must be taken until this technique becomes a useful tool for cardiologists, with favorable impact on the management of a disease with high morbidity, mortality and cost for the healthcare system. Nevertheless, we can state that the interpretation of results by the clinician involved in the patient's treatment will be undoubtedly crucial for its success.

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