JACC: CARDIOVASCULAR IMAGING, VOL. 14, NO. 11, 2021
NOVEMBER 2021:2260–2271

LETTER TO THE EDITOR

Atrial Myopathy in Amyloidosis

Should We Ignore Simple Surface ECG and Basic Echocardiographic Indexes?

Bandera et al (1) investigated left atrial structure and function in patients with transthyretin amyloid cardiomyopathy (1), documenting an atrial electromechanical dissociation (AEMD) by means of echocardiographic speckle tracking in 22% of patients in sinus rhythm. AEMD was associated with poorer prognosis compared with patients with sinus rhythm and effective mechanical contraction. The authors should be congratulated for this study, which adds another piece to our knowledge of the complex pathophysiology and presentation of transthyretin amyloid cardiomyopathy.

However, strain analysis was not feasible in 26.9% of the patients. This high percentage could hamper the results. The authors did not provide electrocardiographic data. It is known that simple parameters like P-wave duration and morphology might provide important clues (2). The presence of an interatrial block may be considered as a surrogate marker of atrial myopathy, and it has been shown to be highly prevalent in heart failure (2,3). Because amyloidosis is an infiltrative disorder, it is likely that the analysis of P-wave morphology in such large cohorts could provide similar or even better risk stratification. Patients with interatrial block might benefit from early anticoagulation even without documented atrial fibrillation (2). In the study by Bandera et al (1), the percentage of patients with AEMD treated with anticoagulants was only 27%.

Another aspect of the study that deserves some comment is the echocardiographic approach. Left atrial volumes (maximum and minimum, emptying fraction, and expansion index) with 2-dimensional echocardiography, together with simple parameters of chamber remodeling (eg, sphericity index), might provide similar information with easy, widely available, and reasonably reproducible measurements also in those patients in whom strain analysis was not feasible (3).

Giuseppe D. Sanna, MD, PhD*
Michele Brignole, MD
Guido Parodi, MD, PhD

*Clinical and Interventional Cardiology
Sassari University Hospital
Via Enrico de Nicola
07100 Sassari, Italy
E-mail: giuseppe.sanna@aousassari.it

https://doi.org/10.1016/j.jcmg.2021.09.024

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.
The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

REFERENCES

1. Bandera F, Martone R, Chacko L, et al. Clinical importance of left atrial infiltration in cardiac transthyretin amyloidosis. *J Am Coll Cardiol*. https://10.1007/s00380-021-01886-z.

2. Bayés de Luna A, Martínez-Sellés M, Bayés-Genís A, Elosua R, Baranchuk A. Surface ECG interatrial block-guided treatment for stroke prevention: rationale for an attractive hypothesis. *BMC Cardiovasc Disord*. 2017;17(1):211.

3. Sanna GD, Argiolas D, Franca P, Saderi L, Sotgiu G, Parodi G. Relationship between electrocardiographic interatrial blocks and echocardiographic indices of left atrial function in acute heart failure. *Heart Vessels*. Published online June 6, 2021. https://doi.org/10.1007/s00380-021-01886-z

THE AUTHORS' REPLY

We read with great interest the letter of Dr. Sanna and colleagues about our study (1). Atrial involvement in cardiac amyloidosis (CA) can be defined in relation to the electric abnormalities or to the mechanical activity as well as histologically with the degree of infiltration and myocyte response. Although historically the focus has been primarily on electric abnormalities, the characterization and the links between mechanical and histological changes and clinical outcomes are now emerging. In terms of electric activation, on the electrocardiogram, we elected to use a simple approach, classifying patients based on the presence of atrial electric activity in relation to mechanical contraction. Although this approach does not encompass the complex model of atrial electric activation, it is easy to use and helps identify the group of patients with atrial electric activation but the absence of mechanical contraction (atrial electromechanical dissociation [AEMD]), a group that is characterized by worse prognosis. However, we agree with Sanna and colleagues that the different stages of electric abnormalities associated with atrial amyloid

infiltration require more attention, and advanced P-wave analysis has the unique potential to identify interatrial block, which is an expression of atrial myopathy associated with amyloid infiltration and is likely to proceed AEMD (2). In terms of mechanical activation, strain analysis allows an accurate characterization of myocardial deformation and, in combination with the E/e′ measurement, an estimation of the stiffness. In our population, atrial strain analysis could not be performed in 26.9% of patients, but prospective dedicated acquisition could significantly reduce this. Sanna and colleagues suggested a role for advanced atrial volume analysis in identifying mechanical failure, especially in those subjects who do not meet the technical requirements for strain analysis. Although this approach is generally useful in other types of cardiomyopathies, where the atrial dilatation is the final common pathway of different mechanisms that negatively affect the ventricular and atrial physiology, in CA atrial amyloid infiltration, by increasing atrial wall stiffness, prevents significant atrial dilatation. Severe atrial dilatation is, in fact, not a common finding in this population, especially when the degree of dilatation is related to the marked systolic and diastolic failure, making deformation-based approaches more suited than volumetric analysis for the risk stratification of this population. As concerns the histological changes, this paper represents one of the most comprehensive reports and confirms the primary role of atrial amyloid infiltration as a cause of atrial dysfunction.

In summary, we are grateful for the interest of Dr. Sanna and colleagues in the role of atrial dysfunction in the pathophysiology of CA. Atrial dysfunction is an important component of overall cardiac performance, and AEMD has emerged as a distinctive phenotype identifying patients in sinus rhythm with poor prognosis. This condition, previously described in small series or anecdotal cases, appears more prevalent than expected. Further studies will be needed to provide evidence on the benefit-risk of initiating anticoagulation in this group of patients.

Francesco Bandera, MD, PhD
Raffaele Martone, MD
Liza Chacko, MD
Sharmananthan Ganesananthan, MS
Janet A. Gilbertson, CSci
Markella Ponticos, PhD
Thirusha Lane, RN, PhD
Ana Martinez-Naharro, MD, PhD
Carol Whelan, MD
Cristina Quarta, MD, PhD
Dorota Rowczenio, PhD
Rishi Patel, MD
Yousuf Razvi, MD
Helen Lachmann, MD
Ashutosh Wechelakar, MD
James Brown, MD
Daniel Knight, MD
James Moon, MD
Aviva Petrie, PhD
Francesco Cappelli, MD
Marco Guazzi, MD, PhD
Luciano Potena, MD
Claudio Rapezzi, MD
Ornella Leone, MD
Philip N. Hawkins, MD, PhD
Julian D. Gillmore, MD, PhD
Marianna Fontana, MD, PhD*
*National Amyloidosis Centre
University College London, Royal Free Campus
Rowland Hill Street
London
NW3 2PF, United Kingdom
E-mail: m.fontana@ucl.ac.uk

https://doi.org/10.1016/j.jcmg.2021.09.025

Dr Fontana is supported by a British Heart Foundation Intermediate Clinical Research Fellowship (FS/18/21/33447). All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.
The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

REFERENCES

1. Bandera F, Martone R, Chacko L, et al. Clinical importance of left atrial infiltration in cardiac transthyretin amyloidosis. *J Am Coll Cardiol*. https://10.1007/s00380-021-01886-z.

2. Lindow T, Lindqvist P. The prevalence of advanced interatrial block and its relationship to left atrial function in patients with transthyretin cardiac amyloidosis. *J Clin Med*. 2021;10:2764.

Identifying Candidates for Early Aortic Valve Replacement in Chronic Aortic Regurgitation

The Way Forward!

We read with interest the study by Senapati et al titled "Regional Replacement and Diffuse Interstitial Fibrosis in Aortic Regurgitation: Prognostic Implications From Cardiac Magnetic Resonance" (1). The study evaluated the association of various cardiac magnetic resonance (CMR) biomarkers of fibrosis, including late gadolinium enhancement, extracellular volume (ECV) and indexed ECV with