

P-wave characteristics and atrium voltage mapping in cardiac amyloidosis with paroxysmal atrial fibrillation

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Unexplained atrial tachyarrhythmias are frequently encountered in clinical practice.¹ However, the underlying aetiology predisposing the atrium to develop the arrhythmias has not been fully elucidated. Amyloid fibril infiltration into the atrial myocardium is associated with atrial tachyarrhythmias, which often leads to clinical deterioration.² Because areas of low atrium voltage are thought to be fibrotic lesions,³ P-wave characteristics and anatomical reconstruction with a three-dimensional mapping system could suggest amyloid infiltration. Here, we describe two heart failure patients with paroxysmal atrial fibrillation (AF) in whom atrium voltage was assessed prior to catheter ablation.

In *Figure 1A*, a 72-year-old male patient with paroxysmal AF had heart failure of New York Heart Association (NYHA) class II. The serum level of N-terminal pro-brain natriuretic peptide (NT-pro-BNP) was 2366 pg/mL. Transthoracic echocardiogram revealed left ventricular (LV) ejection fraction (EF) of 40% with a thickened LV wall. During sinus rhythm, a slightly prolonged PR interval of 240 msec, decreased P-wave voltage, and prolonged P-wave duration were observed on electrocardiography. Electroanatomic 3-D voltage mapping in the left atrium indicated extensive low-voltage areas defined as <0.30-mV regions. Catheter ablation was successfully performed for his paroxysmal AF. Electrocardiographic and voltage mapping findings suggested the presence of amyloid infiltration. ^{99m}Tc-labelled bone scintigraphy indicated cardiac uptake on planar imaging (Perugini grade 3). Single-photon emission computed tomography and computed tomography fusion

imaging confirmed the uptake into atrial (white arrow) and ventricular (red arrow) myocardia. Endomyocardial biopsy (EMB) from the right ventricle and gene mutation test confirmed the patient had a wild-type transthyretin amyloidosis with cardiomyopathy. Treatment with tafamidis meglumine of 80 mg was initiated thereafter.

In *Figure 1B*, a 71-year-old male presented with paroxysmal AF and NYHA class II symptoms with NT-pro-BNP of 2064 pg/mL. Echocardiogram showed LV hypertrophy with mid-range EF (43%). Conduction disturbance, decreased voltage of P wave, and prolonged P-wave duration were undetected in the sinus rhythm. Left atrial bipolar voltage mapping did not show any abnormal areas. His AF was ablated without complication. Right ventricular EMB did not find any pathological evidence suggestive of known cardiomyopathies. Therefore, the patient was diagnosed as unclassified cardiomyopathy.

Electrophysiologic properties of atrial myocardium such as P-wave characteristics and atrium voltage mapping might be able to identify atrial remodelling in cardiac amyloidosis. Although decreased atrium electrical signal suggests the presence of fibrosis and conduction abnormalities in an older, sick, dilated, or stretched atrium, atrium with extensive low-voltage areas may require further investigation of amyloid cardiomyopathy.

Consent: The authors confirm that written consent for submission and publication of this case report including images and asso-

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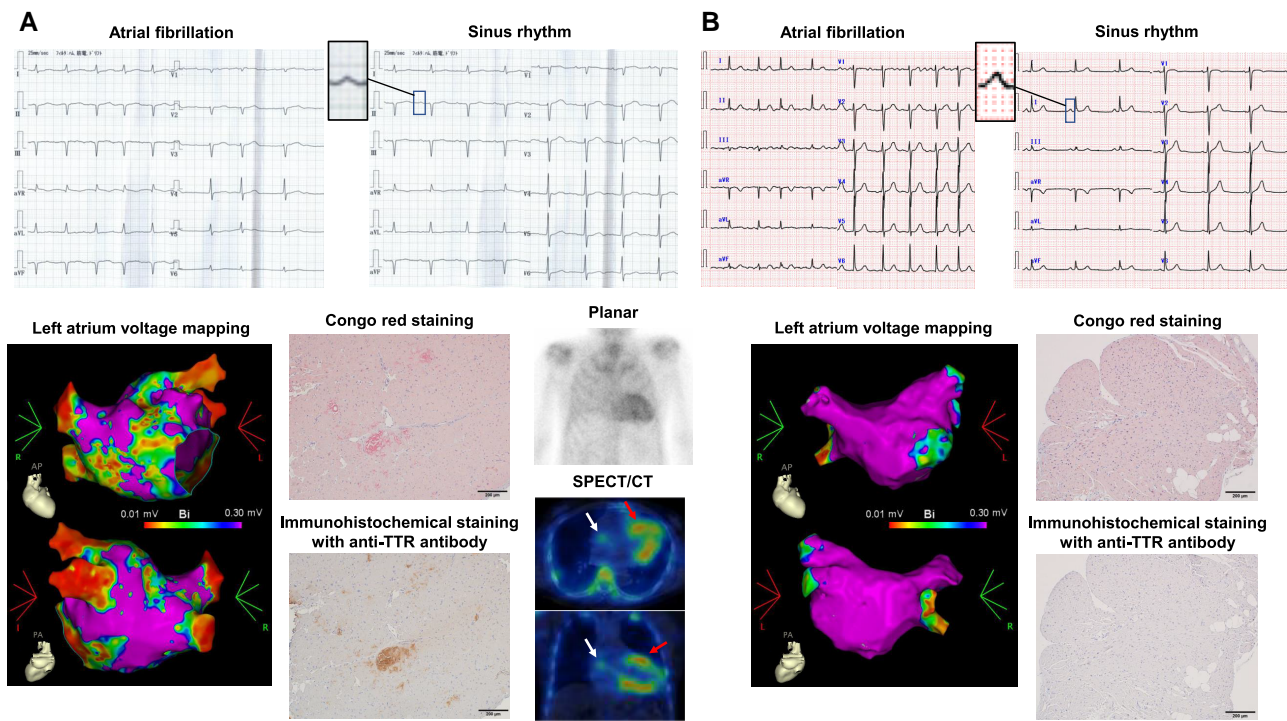


Figure 1 (A) A 72-year-old male patient with paroxysmal atrial fibrillation (AF) having heart failure of New York Heart Association (NYHA) class II. P-wave characteristics during sinus rhythm suggesting atrial remodeling. Left atrial electroanatomical voltage mapping indicating extensive low-voltage areas. ^{99m}Tc -labelled bone scintigraphy demonstrating cardiac uptake on planar imaging and myocardial uptake into the atrium and ventricle on single-photon emission computed tomography/computed tomography imaging. Endomyocardial biopsy (EMB) specimen demonstrating deposits of congophilic material and positive immunohistochemical staining with anti-transferrin receptor (TTR) antibody. (B) A 71-year-old male presenting with paroxysmal AF and NYHA class II symptoms. Conduction disturbance, decreased voltage of P wave, and prolonged P-wave duration were not confirmed in sinus rhythm. Left atrial voltage mapping showing no abnormal areas. EMB did not find any pathological evidence suggestive of known cardiomyopathies.

ciated text has been obtained from the patient in line with COPE guidance.

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Data availability

No new data were generated or analysed in support of this research.

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