A 78-year-old man was referred for cardiovascular magnetic resonance (CMR) to investigate asymmetrical left ventricular hypertrophy identified by echocardiography. Electrocardiography showed first-degree heart block with a long duration (140 ms), low-voltage P wave, and atrial arrhythmia identified on 48 h Holter monitoring. CMR showed biatrial dilation, severe left ventricular hypertrophy, and globally impaired systolic function. Following intravenous gadolinium, there was early myocardial enhancement of the left ventricle, with a prominent subendocardial pattern. However, enhancement was also clearly seen in both atrial walls (Panels A–C).

CMR is a well-established diagnostic investigation for cardiac amyloidosis. It has been shown that there is a high myocardial gadolinium concentration early after injection typically with subendocardial late enhancement, which correlates with morphological markers of increased cardiac amyloid load. The atrial morphology and the endocardial accumulation of amyloid are consistent with the electrocardiographic findings. Iatrogenic left atrial enhancement has been described following pulmonary vein isolation; however, we believe this to be the first description of atrial gadolinium enhancement in a disease state. The accumulation of gadolinium in atria suggests that some of the cardiac manifestations of amyloidosis may not be due to ventricular infiltration alone. The CMR assessment of this abnormal interstitial protein in atrial myocardium may potentially correlate better with the occurrence of atrial arrhythmia and conduction defects than with ventricular enhancement alone.

Panel A  Cardiovascular magnetic resonance identifying atrial involvement in the patient with amyloidosis: vertical long axis.
Panel B  Cardiovascular magnetic resonance identifying atrial involvement in the patient with amyloidosis: left ventricular outflow tract.
Panel C  Cardiovascular magnetic resonance identifying atrial involvement in the patient with amyloidosis: four-chamber view.