We present the case of a 64-year-old male who presented to the emergency room because of recent onset palpitations. He was diagnosed with a first episode of atrial fibrillation and was managed at the emergency room by direct current cardioversion. The patient's past medical record was unremarkable, and no relevant findings were discovered during the physical examination or laboratory tests. The baseline ECG is shown in Figure 1. On discharge the patient was referred for outpatient cardiology evaluation and was eventually seen 2 months later. The ECG at the outpatient clinic is shown in Figure 2.

Which drug was most likely prescribed to the patient to account for the differences between the first and second ECGs?

Please turn the page to read the diagnosis.
RESPONSE TO ECG CHALLENGE

The ECG shows an intraventricular conduction delay in the context of hypertrophic cardiomyopathy, which is worsened by propafenone administration.

Baseline ECG (Figure 3A) shows sinus rhythm with first atrioventricular block; the PR interval is 0.280 seconds long. The QRS complex is wide (0.110 seconds), showing a nonspecific conduction delay. An R wave is absent on leads V1 and V2 (QS morphology) with a notch in the descending part of the Q wave in lead V2. Small Q waves also appear in leads I, aVL and frontal QRS axis is at −20º. Alterations of the repolarization were also present, such as asymmetrical and negative T waves in lateral leads (V3–V6, I, and aVL). Compared with baseline ECG, the one on propafenone (Figure 3B) shows conduction intervals increase by ≈30% (PR 360 mseg and QRS 140 mseg). The patient had been on a daily dose of 450 mg (150 mg/8 hours) of propafenone; when it was discontinued, the ECG returned to baseline. Propafenone was initiated at the emergency department and was continued in the presence of good clinical tolerance and maintenance of sinus rhythm. Later on, ECG and cardiac magnetic resonance (Figure 4) confirmed the structural diagnosis, showing asymmetrical hypertrophy of the ventricular walls, a maximum thickness of 23 mm at the mid-septum, and disorganized fibrosis along the septum.

Proarrhythmic properties of antiarrhythmic drugs have been known for years. Some antiarrhythmics have the ability to slow electric conduction through the myocardium, which is the mechanism proposed to cause sudden cardiac arrhythmic death reported in selected patients taking antiarrhythmics (IC) agents. This is usually observed in the presence of structural abnormalities predisposing to reentry phenomena.1 In addition, IC antiarrhythmic drugs are the most powerful sodium channel blockers. As a consequence, they produce the strongest myocardial conduction delay and therefore prolongation in conduction intervals.2

The prolongation of conduction intervals is dose-dependent, and it can reach up to 20% of baseline duration at maximum doses of propafenone.3 Higher prolongations should worry clinicians because it can reflect a risk of drug toxicity and proarrhythmic effects. Dose reduction may be sufficient to deal with mild prolongations, often observed in the face of poor metabolizers or drug interactions at the cytochrome P450 pathway. However, in our case, absolute discontinuation was mandatory as soon as hypertrophic cardiomyopathy was diagnosed. Other side effects of propafenone, such as dizziness or metallic taste, may be tolerable, but some patients may experience hypotension or ventricular dysfunction, which can be especially harmful in hypertrophic cardiomyopathy.

In summary, we present a case of a worsening conduction delay because of propafenone in the context of hypertrophic cardiomyopathy. Intraventricular conduction delay is frequently observed with IC agent therapy. However, excessive QRS prolonga-

Figure 2. ECG at the cardiology outpatient clinic.
tions should warn about potential drug toxicity, and dosage should be adjusted. Structural heart disease is a general contraindication for IC antiarrhythmics because of its intrinsic predisposition to ventricular arrhythmias.

DISCLOSURES
None.

AFFILIATIONS
From Instituto de Ciencias del Corazón, Valladolid, Spain; Department of Cardiology, Hospital Clínico Universitario, Valladolid, Spain; and CIBER de Enfermedades Cardiovasculares, Madrid, Spain.

FOOTNOTES
Circulation is available at http://circ.ahajournals.org.

REFERENCES
Worsening Conduction Delay in Hypertrophic Cardiomyopathy: What Drug Is Responsible?
Pablo Elpidio García-Granja, María Sandín-Fuentes, Emilio García-Morán, Teresa Sevilla and Jerónimo Rubio

Circulation. 2017;136:599-601
doi: 10.1161/CIRCULATIONAHA.117.029572
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2017 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/136/6/599

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org/subscriptions/