**Interesting Electrocardiogram Complex Case Study**

Immediate and Regular Electrocardiogram Monitoring to Assess Conduction and Proarrhythmia of Flecainide

Ismail Hamam, MD, Steven J. Kalbfleisch, MD and Mahmoud Houmsse, MD

Division of Cardiology, The Ohio State University, Wexner Medical Center, Columbus, OH

**KEYWORDS.** antiarrhythmic drug, flecainide, intracardiac conduction.

**Introduction**

Flecainide acetate is a class 1c antiarrhythmic drug discovered in 1975.1 The drug is classified as 1c according to the classification of Vaughan–Williams because of its antiarrhythmic activity which consists of a wide electrophysiological spectrum.2 In human beings, flecainide produces a dose-related decrease in intracardiac conduction in all parts of the heart with the greatest effect on the His–Purkinje system. Effects upon atroventricular (AV) nodal conduction time and intra-atrial conduction times, although present, are less pronounced than those on ventricular conduction velocity.2 It slows conduction in the myocardium by restricting fast movement of sodium ions into the myocardial cell membranes to allow maximum expiratory flow. Flecainide is used to treat patients experiencing paroxysmal supraventricular tachycardias, including AV nodal re-entrant tachycardia and AV re-entrant tachycardia. Flecainide can also lower sinus node activity in patients with sinus node disease. The drug is also effective in treating atrial fibrillation (AF) or atrial flutter. More recently, flecainide was also found to be useful in treating patients with catecholaminergic polymorphic ventricular tachycardia (CPVT) due to a reduction in the frequency of Ca2+ sparks and waves.3 The purpose of this case report and literature review is to increase awareness of the conduction properties and the proarrhythmia of the flecainide.

**Case 1**

A 66-year-old female patient who had a history of paroxysmal AF, sinus bradycardia, and hypertension. She was started on flecainide 2 years ago. She presented to the electrophysiology clinic in July complaining of dizziness for the past 7 months. She noticed that the dizziness usually resolved with rest. She had extensive work-up for the dizziness and was negative. After the patient was seen in July she was advised to take 50 mg of flecainide twice a day instead of 100 mg twice a day. At follow-up in August and September, the patient did not have any symptoms of dizziness or lightheadedness. Figures 1–4 show the patient’s electrocardiograms (ECGs). Values of the PR and QRS intervals for the patient are listed in Table 1. The normal PR interval duration is 120–200 ms, and the QRS is 60–100 ms. This patient had longer PR values than normal for 3 out of the 4 months, with August being the only month during which the patient had a normal PR interval. The QRS durations became close to normal after July. These results can be explained by the small doses the patient was prescribed to take after July. This particular patient did well under small doses of flecainide. The inconsistency in the ECGs of the patient is most likely due to the antiarrhythmic drug flecainide.

The authors report no conflicts of interest for the published content. Manuscript received June 4, 2014, final version accepted July 16, 2014.

Address correspondence to: Ismail Hamam, MD, CEPS, P.O. Box 212614, Amman Jordan 11121. E-mail: ismailhamam2000@yahoo.com

1758 The Journal of Innovations in Cardiac Rhythm Management, September 2014

DOI: 10.19102/icrm.2014.050906
Figure 1: Electrocardiogram recorded on June 6, 2011.

Figure 2: Electrocardiogram recorded on July 27, 2011.

Figure 3: Electrocardiogram recorded on August 5, 2011.
Table 1: PR and QRS duration summary of electrocardiograms in Figures 1–4

<table>
<thead>
<tr>
<th>Date</th>
<th>PR duration (ms)</th>
<th>QRS duration (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 14, 2011</td>
<td>214</td>
<td>94</td>
</tr>
<tr>
<td>August 05, 2011</td>
<td>196</td>
<td>102</td>
</tr>
<tr>
<td>July 27, 2011</td>
<td>226</td>
<td>128</td>
</tr>
<tr>
<td>June 06, 2011</td>
<td>208</td>
<td>110</td>
</tr>
</tbody>
</table>

Figure 4: Electrocardiogram recorded on September 14, 2011.

Figure 5: Baseline electrocardiogram at the beginning of the exercise stress test after five doses of flecainide 150 mg twice a day in the patient in Case 2.
Case 2
A 63-year-old male with known history of AF who had AF ablation in the past and was treated with flecainide 50 mg twice a day. He was admitted for flecainide increase from 50 mg to 150 mg twice a day. After a total of five doses of the new flecainide dose, he underwent echo and exercise stress tests. Echo showed normal heart structure and normal left ventricular function. The stress test was negative for ischemia, but he developed widening of the QRS followed by monomorphic VT on the treadmill that terminated spontaneously after rest. The flecainide was stopped and he was started on sotalol.

Discussion
Side effects of flecainide are minimal and include visual disturbance, nervousness, and dizziness (Figures 5–7). Chest pain, dyspnea, tremor, headache, fatigue, and nausea are rare side effects of the drug. Patients who are diagnosed with AV block, congestive heart failure, sinus node dysfunction, or bundle branch block are advised to be cautious with the medicine and/or be treated with small doses. The drug does not affect the resting potential of the myocardial cell. Working capacity and blood pressure are unaffected by flecainide.1 Side effects after being injected with flecainide include temporary thickness of the tongue, palate, and lips shortly after administration of the drug.4 Flecainide has been found to be effective in treating a wide variety of cardiac arrhythmias. However, it has significant electrophysiological effects, including a decrease in conduction within the myocardium and right atrium. It is also known to delay AV nodal conduction times.2 The drug causes the PR and the QRS intervals to increase and the conduction velocity to decrease in the atrium.1 The study done by the Department of Cardiology at Saint Bartholomew’s Hospital in London depicted that the QRS duration increased in 44 out of 47 patients being studied. A majority of the patients also showed an increased QT interval.2 For the most part, cardiac activity is dose dependent; the drug has significant effects if administered in high dosages. For example, a large dose of flecainide can cause a depressant effect on ventricular muscle refractoriness.2 Furthermore, the Cardiac Arrhythmia Suppression Trial (CAST) results show that flecainide is associated with sudden death or cardiac arrest due to arrhythmia. The study further illustrates that patients who have left ventricular dysfunction after myocardial infarction and are being treated with flecainide are at high risk of death.5

Conclusion
Flecainide is a useful medication to manage a wide variety of cardiac arrhythmias. It should be administered, however, with caution and be followed closely, especially in patients with pre-existing conduction system diseas.
References


Figure 7: Electrocardiogram of the patient in Case 2 showing wide complex tachycardia after a few minutes of the exercise stress test.