Case Report

QT interval prolongation and torsade de pointes: Synergistic effect of flecainide and H_1 receptor antagonists

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ABSTRACT

A high percentage of patients having atrial fibrillation (AF) presents with paroxysmal AF. Flecainide, the prototypic class Ic anti-arrhythmic drug is the most effective drug to maintain sinus rhythm in this subgroup of patients, though the drug has potential pro-arrhythmic effects. Furthermore, the H_1 receptor antagonists are the most commonly prescribed drugs for the symptomatic treatment of pruritus. Despite having low number of adverse effects, the H_1 receptor antagonists have cardiotoxic effects. Flecainide and H_1 receptor antagonists present arrhythmic complications including QT interval prolongation and torsade de pointes (TdP). The case presented here is a 65-year-old female who was diagnosed of atrial fibrillation and presented with rashes in lower extremities. The patient was treated using flecainide and H_1 receptor antagonists (loratadine and hydroxyzine) that prolonged QT interval and induced TdP. The concomitant administration of flecainide and H_1 receptor antagonists seems to have a synergistic effect in QT interval prolongation and subsequent TdP. The concurrent administration of H_1 receptor antagonists to patients receiving class Ic anti-arrhythmic drugs should be avoided in order to reduce arrhythmic risk in this population.

Key words: Arrhythmia, flecainide, H_1 receptor antagonist, QT interval

INTRODUCTION

Atrial fibrillation (AF) is the most common sustained arrhythmia in adults, and a high percentage of these patients present with paroxysmal AF. Flecainide, a class Ic anti-arrhythmic drug is the most effective drug to maintain sinus rhythm in this subgroup of population though the drug has potential pro-arrhythmic effects, including QT interval prolongation and ventricular tachycardia like torsade de pointes (TdP).[1] Furthermore, the H_1 receptor antagonists are the most commonly prescribed drugs for the symptomatic treatment of pruritus. Despite having low number of adverse effects, the H_1 receptor antagonists have cardiotoxic effects and they have been associated with QT interval prolongation and TdP.[2,3]

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The objective of this article is to describe the synergistic effect of flecainide and H_1 receptor antagonists in prolonging QT interval and inducing ventricular arrhythmias.

CASE REPORT

A 65-year-old female patient was admitted to our institution with palpitations, progressive dyspnea accompanied by orthopnea and paroxysmal nocturnal dyspnea. The patient had a history of hypertension, dyslipidemia, diabetes mellitus, asthma, and paroxysmal AF, and was treated with amiodarone which was stopped because of hyperthyroidism.

Electrocardiogram demonstrated AF at 137 beats per minute, narrow QRS, and absence of repolarization abnormalities. The lung auscultation showed crepitant rales in both lower lung lobes, and the chest radiography showed signs of vascular redistribution. Transthoracic echocardiography (TTE) showed left and right ventricles of normal size and contractility, mild dilatation of the left atrium (44 mm), and no other relevant abnormalities.

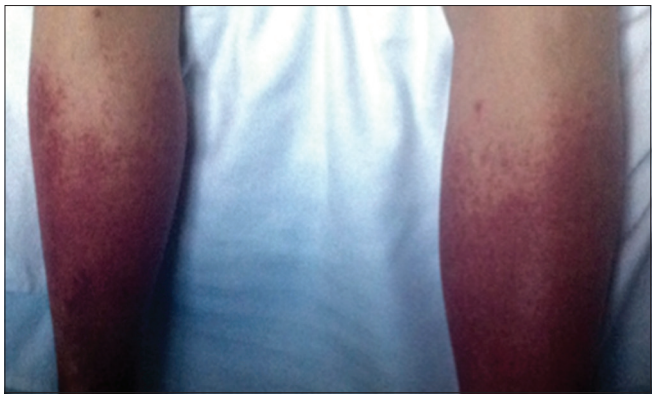

Figure 1: Rash in lower extremities

By treatment with parenteral anticoagulation and diuretics, the patient's condition was stabilized; congestive symptoms were controlled, spontaneously returning to sinus rhythm. After stabilization, bisoprolol (2.5 mg/12 h) and flecainide (50 mg/12 h) were initiated in order to maintain sinus rhythm. During hospitalization, the patient developed a pruriginous rash on lower extremities [Figure 1] that required treatment with oral H_1 receptor antagonists loratadine (10 mg/24 h) and hydroxyzine (25 mg/24 h), prolonging the hospital stay of the patient.

On the fourth day of concomitant therapy with flecainide and H_1 receptor antagonists, the patient had cardiac arrest secondary to TdP because of prolongation of QT interval that degenerated into ventricular fibrillation requiring cardiac defibrillation for six times, orotracheal intubation, and advanced cardiopulmonary resuscitation support, and the pulse recovered after 15 min [Figures 2–4]. Cranial computerized tomography scan revealed no intracranial bleeding or ischemic stroke and coronary angiography showed no significant coronary lesions. The patient presented a good recovery, being extubated 72 h after the cardiac arrest without neurologic sequelae. The patient presented again with AF and we opted for rate control strategy [Figure 5], initiating treatment with beta-blockers (bisoprolol 2.5 mg/12 h) for obtaining adequate heart rate. The patient was discharged and remains asymptomatic at 1 month follow-up.

DISCUSSION

TdP is a polymorphic ventricular tachycardia syndrome that occurs in the context of long prolongation of the QT interval. This occurs because of the slowing of repolarization due to blockade of the delayed rectifier potassium current (IKr) producing prolongation of action potential. This slowing of

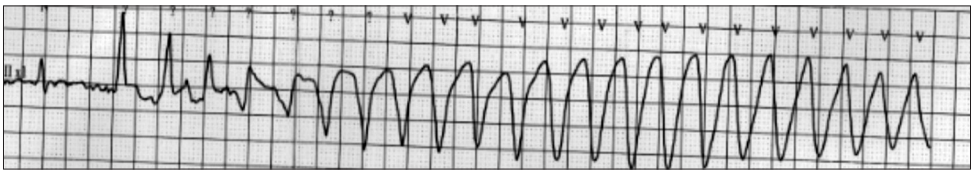

Figure 2: Electrocardiogram during cardiac arrest: Torsade de pointes

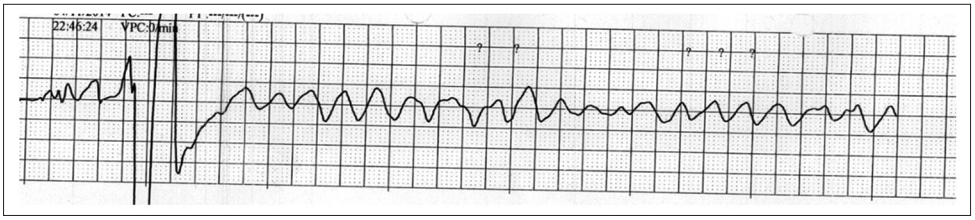

Figure 3: Electrocardiogram during cardiac arrest: Ventricular fibrillation

repolarization induces bradycardia and QT prolongation, predisposing to TdP.[4]

In accordance with clinical guidelines, flecainide is the preferred anti-arrhythmic drug in order to maintain sinus rhythm in patients with no structural heart disease because of its high rate of preserving sinus rhythm and low rate of adverse events in comparison with alternative drugs.[1] Nevertheless, flecainide, as an anti-arrhythmic drug presents with pro-arrhythmic effects previously identified in CAST trial[5] and experimental models of ischemia.[6] An increase in the rate of sudden death in patients taking flecainide was reported in the CAST trial,[5] principally related to QT interval prolongation and TdP.

The H_1 antagonist receptors have sedative and anti-cholinergic effects, and they even have potential cardiotoxic effects, including arrhythmic complications. The most frequent arrhythmogenic complications are palpitations and extrasystoles. However, the H_1 receptor antagonists can cause malignant ventricular arrhythmias like TdP due to QT interval prolongation.[2,3,7]

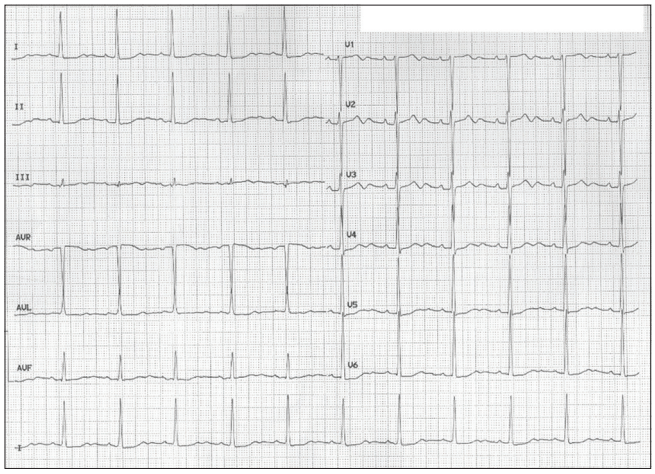

Figure 4: Electrocardiogram immediately after cardiac arrest: Sinus rhythm with QT interval prolongation

The interaction between H_1 receptor antagonists and flecainide presents an exceptional occurrence and it has been very rarely reported. Although the management of these interactions is not reflected in clinical practice guidelines, the guidelines recommend that patients receiving flecainide or other class Ic anti-arrhythmic drugs must undergo strict control of QT interval.[1]

In addition, patients receiving H_1 receptor antagonists should stop using class Ic anti-arrhythmic drugs because of pruriginous rashes and be treated with alternative anti-arrhythmic drugs with neutral effects on the QT interval.[1] Furthermore, in rare cases where patients necessarily require continuing the treatment with flecainide, H_1 receptor antagonists could be replaced by corticosteroids.[8]

CONCLUSION

The concomitant administration of flecainide and H_1 receptor antagonists seems to have a synergistic effect in QT interval prolongation and subsequent TdP. The concurrent administration of H_1 receptor antagonists to patients receiving class Ic anti-arrhythmic drugs should be avoided in order to reduce arrhythmic risk in these patients.

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Conflicts of interest
There are no conflicts of interest.

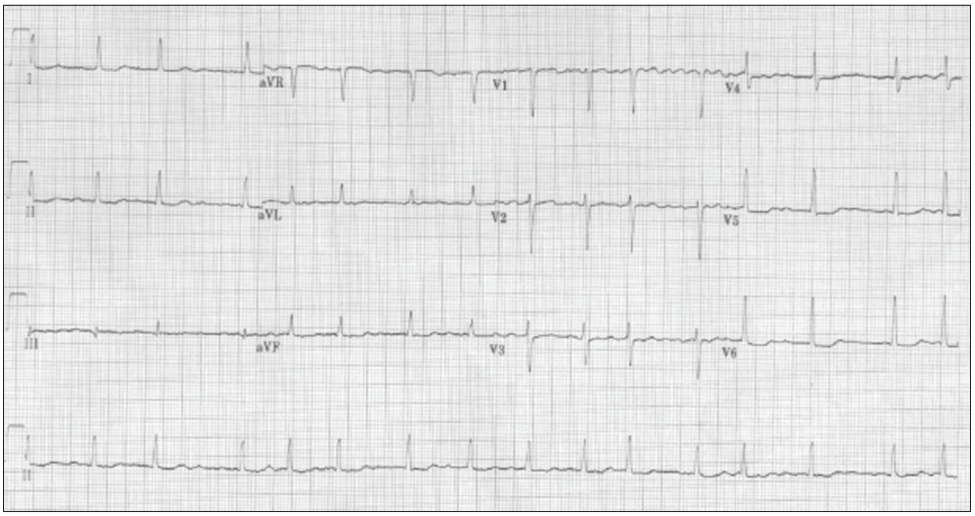

Figure 5: Electrocardiogram after patient stabilization: Atrial fibrillation with absence of QT interval prolongation

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