Torsades de Pointes during Treatment of Tachycardia-Induced Cardiomyopathy

Dong-Kyu Lee, M.D., Il Hwan Ryu, M.D., Ji Hyung Yoo, M.D., Su A Yun, M.D., Sang Hyun Park, M.D., Ki-Woon Kang, M.D., Won Ho Kim, M.D., Yu Jeong Choi, M.D., Ph.D., Kyung Tae Jung, M.D., Ph.D., and Jung Yeon Chin, M.D.

Division of Cardiology, Department of Internal Medicine, Eulji University Hospital, Daejeon, Korea

Tachycardia-induced cardiomyopathy (TC) is caused by sustained arrhythmia and typically characterized by left ventricular systolic dysfunction and congestive heart failure. Early treatment for TC includes the use of various drugs, including diuretics, anticoagulant, β-blocker, in combination with antiarrhythmic drugs. However, the combination medical therapy is known to increase the risk of prolonged QT interval, electrolyte imbalance and heart failure, which lead to serious arrhythmia such as torsades de pointes (TdP) unless they are treated properly. We present a case of TdP occurred in a patient being treated for TC and review other cases from the literature.

CASE REPORT

A 45-year-old woman presented with palpitations occurring three to four times per month over a period of one year and difficulty in breathing that lasted for one month. The patient did not undergo a cardiac evaluation before but had a history of hysterectomy due to uterine myoma. On admission, the patient had a blood pressure of 119/104 mmHg, pulse rate of 169 beats per minute (bpm), respiration rate of 22 per minute and temperature of 37℃. Complete blood cell count revealed leukocyte of 11,300/mm³ (neutrophils 8,630/mm³) and hemoglobin of 14.9 g/dl. Serum sodium and potassium were 142 mmol/L, and 4.2 mmol/L, respectively. And brain natriuretic peptide was elevated to 1120 pg/ml (normal range: 164 pg/ml or lower). Thyroid function test were normal showing T3 54 ng/ml, free T4 1.33 ng/ml and TSH 0.92 μIU/ml. However, chest radiography showed cardiomegaly and bilateral pulmonary edema (Fig. 1a). Also, electrocardiography showed atrial fibrillation with a heart rate of 172 beats/min, and the adjusted QT interval was 450 msec (Fig. 2a). Echocardiogram detected severe left ventricular (LV) systolic dysfunction with LV ejection fraction of 15% and mild left ventricular dilation indicated by LV end-diastolic dimension of 59 mm (Fig. 3a). The patient was diagnosed with tachycardia-induced cardiomyopathy and given digoxin, furosemide, spironolactone, angiotensin converting enzyme inhibitor in combination with warfarin and heparin after being admitted to an ICU. On the first day after admission, her digoxin level was 0.51 ng/ml (normal range 0.8-2.4 ng/ml). As atrial fibrillation was still present on the second day after admission, a transesophageal echocardiography was performed. After we checked no thrombus in left atrium and left atrial appendage, amiodarone (60 mg/hr) was infused intravenously to restore sinus rhythm. To achieve car-
Fig. 1. Chest radiography showed (A) cardiomegaly with bilateral pulmonary edema at 1st day of admission and (B) decreased heart size as compared to that of 1 day of admission and disappearance of pulmonary edema at 15th day of admission.

Fig. 2. 12-lead electrocardiogram (ECG) showed (A) atrial fibrillation with rapid ventricular response at admission and (B) atrial flutter with 3:1 atrioventricular conduction with markedly prolonged corrected QT interval at 4th day of admission.

dioversion of atrial fibrillation sustained until the third day after admission, electric shock was delivered at initial energy of 100 J, followed by second energy of 150 J. Because electrical cardioversion was not successful, the patient was treated with oral...