Refractory ventricular fibrillation caused by caffeine intoxication

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**Introduction**: It is broadly believed that caffeine can exert cardiotoxicity at overdose intakes. Several reports have described cardiac arrest or acute arrhythmia in individuals with caffeine intoxication. However, clinical observations on patients with pure caffeine intoxication have been strongly limited, hence its cardiotoxicity remains to be elucidated. Here, we provide the first report of a female who took caffeine tablets and presented with refractory ventricular fibrillation (VF).

**Methods**: The patient was a 30-year-old Japanese woman with no significant personal or family medical history. She had taken 120 tablets of over-the-counter caffeine products, containing 100 mg of caffeine each, in her room. One or two hours after the intake, she vomited and then had a generalized seizure. Her family found her and called an ambulance. On the way to the hospital, she went into cardiopulmonary arrest associated with recurrent VFs. After two instances of shocks with an automated external defibrillator, her rhythm changed to pulseless electrical activity. However, VFs recurred in the emergency department, and three more rounds of 150-J biphasic countershocks achieved a recovery to spontaneous circulation. A 12 lead-electrocardiogram (ECG) after the defibrillation showed a sinus tachycardia with multiple supraventricular premature contractions and diffuse T wave inversions. Considering the refractory nature of VFs in this patient, we introduced percutaneous cardiopulmonary support (PCPS). No further VFs recurred after the introduction of these therapies. ECG revealed a sinus tachycardia with heart rate between 100 and 140 beats/min and frequent ventricular premature contractions for the initial 10 h. This then changed to QTc interval prolongation, greater than 630 ms, and diffuse notched T waves, which resolved to normal on the 10th day. A transthoracic echocardiography and coronary angiography revealed no abnormalities on the valves or wall motions and no stenosis of the coronary arteries, respectively. The PCPS was successfully removed four days after admission.

**Result**: After a recovery of consciousness, she documented an overdose intake of caffeine tablet obtained via internet for a suicidal purpose. A blood examination, which was sampled at the emergency room, revealed an elevated caffeine concentration of 172 mg/L. She was discharged to her home 16 days after admission without any physical deficits. Exercise tolerance test performed after discharge did not induce any arrhythmias. Ultimately, we confirmed caffeine intoxication caused VFs and subsequent complications.
Conclusion: We have detailed the potentially lethal arrhythmogenesis of caffeine in a human case. Intensive treatments against refractory arrhythmia may have an impact upon the prognosis of patients with caffeine intoxication. Further discussions are needed to prevent intoxication with caffeine, which is available unrestricted.