Right ventricular outflow tract tachycardia after an initial dose of amantadine

Amantadin kullanımı sonrası sağ ventrikül çıkış yolu taşikardisi

Cüneyt Kocaş, M.D., Yusuf Türkmen, M.D., Gökhan Çetinkal, M.D., Sait Mesut Doğan, M.D.

Department of Cardiology, Cardiology Institute of Istanbul University, Istanbul

Summary– Amantadine hydrochloride is an antiviral agent that is also effective in the treatment of Parkinson's disease. In the literature, cardiac arrhythmia is reported in toxic doses of amantadine, but in this paper we report a patient with right ventricular outflow tract (RVOT) tachycardia after an initial dose of amantadine. A 47-year-old female patient was admitted to the emergency department with the complaint of palpitation and dizziness after taking 200 mg amantadine. A 12–lead standard ECG showed wide QRS complex tachycardia with a heart rate of 167/min. The wide QRS complex tachycardia had an inferior axis and left bundle branch block morphology, compatible with RVOT ventricular tachycardia (RVOT-VT). Tachycardia terminated spontaneously and sinus ECG was completely normal. No arrhythmia was inducible at the electrophysiological study. To the best of our knowledge, this is the first case in the literature to describe RVOT-VT after amantadine intake. Amantadine may cause RVOT-VT as well as other cardiac arrhythmias.

Özet– Amantadin hidroklorür bir antiviral madde olmasına karşın Parkinson hastalığının tedavisinde de çok etkilidir. Literatürde toksik dozlarda amantadin alımı sonrasında aritmiler bildirilmekle beraber bizim olgumuzda amantadinin ilk dozu sonrasında sağ ventrikül çıkış yolu taşikardisi ortaya çıkmıştır. Kırk yedi yaşında kadın hasta 200 mg amantadin alımı sonrasında çarpıntı ve baş dönmesi yakınmasıyla acil servise başvurdu. Kalp hızı 167/dk olan hastanın 12 derivasyonlu EKG'sinde geniş QRS'li taşikardi mevcuttu. EKG'deki sol dal bloğu ve inferiyor aks sağ ventrikül çıkış yolu taşikardisini düşündürdü. Taşikardi kendiliğinden sonlandı ve sinüs EKG tamamen normale döndü. Yapılan elektrofizyolojik incelemede aritmi uyarılamadı. Bildiğimiz kadarıyla, bu olgu literatürde amantadin kullanımı sonrası sağ ventrikül çıkış yolu taşikardisi geliştiği bildirilen ilk olgudur. Amantadinin diğer kardiyak aritmiler yanında sağ ventrikül çıkış yolu taşikardisine de neden olabilir.

Amantadine hydrochloride is an antiviral agent which is also used in the treatment of Parkinsonism. It brings symptomatic relief in Parkinsonism by increasing the synthesis and release of dopamine from dopaminergic neurons in the corpus striatum. While the literature contains reports of cardiac arryhythmias in toxic doses of amantadine, this case report describes a patient who developed right ventricular outflow tract (RVOT) after an initial dose of amantadine.[1–3]

Abbreviations:

EPS	*Electrophysiological study*
LBBB	*Left bundle branch block*
NMDA	*N-methyl-D-aspartate*
RVOT	*Right ventricular outflow tract*
VT	*Ventricular tachycardia*

CASE REPORT

A 47-year-old female patient was admitted to the emergency department with the complaint of palpitation and dizziness after taking 200 mg Amantadine. She had been on several medications for Parkinsonism for 2-year period and she had most recently been administered amantadine. Physical examination of the cardiovascular and other systems was normal except for the tachycardia. Blood pressure was 100/60 mm g and heart rate was 168 beats/min. A 12-lead standard ECG showed wide QRS complex tachycardia with a heart rate of 167/min. The wide QRS complex tachycardia

Received: January 30, 2015 *Accepted:* April 03, 2015

Correspondence: Dr. Cüneyt Kocaş. İstanbul Üniversitesi Kardiyoloji Enstitüsü, Kardiyoloji Anabilim Dalı, İstanbul, Turkey.
Tel: +90 212 - 440 00 00 e-mail: cuneytkocas@hotmail.com

was compatible with RVOT-VT, having an inferior axis and left bundle branch block morphology (Figure 1). Tachycardia terminated spontaneously and sinus ECG was completely normal (Figure 2). Baseline ECG showed no abnormality. Her laboratory values were normal except for mild hypokalemia (3.8 mmol/L). We interned the patient to our coronary care unit and started oral beta blocker therapy. 24-hour rhythm follow-up was performed in the coronary care unit and no arrhythmia was observed. Ventricular tachycardia did not recur on beta-blocker therapy. Coronary angiography was performed and revealed normal coronary arteries. After the third day of cessation of beta blocker therapy, an electrophysiological study (EPS) was performed and arrhythmia could not be induced.

DISCUSSION

Although amantadine began life as an antiviral agent, evidence has been reported supporting its role as a

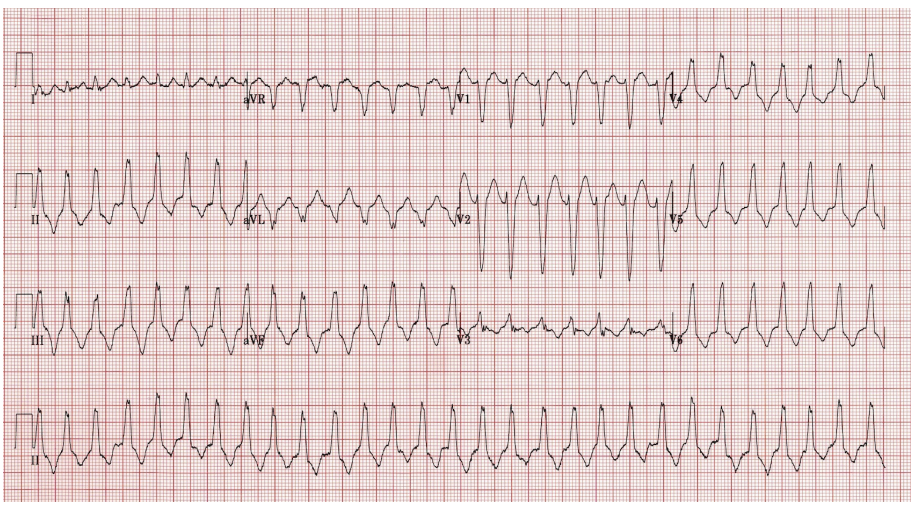

Figure 1. RVOT tachycardia: Broad complex, inferior axis and LBBB-like morphology.

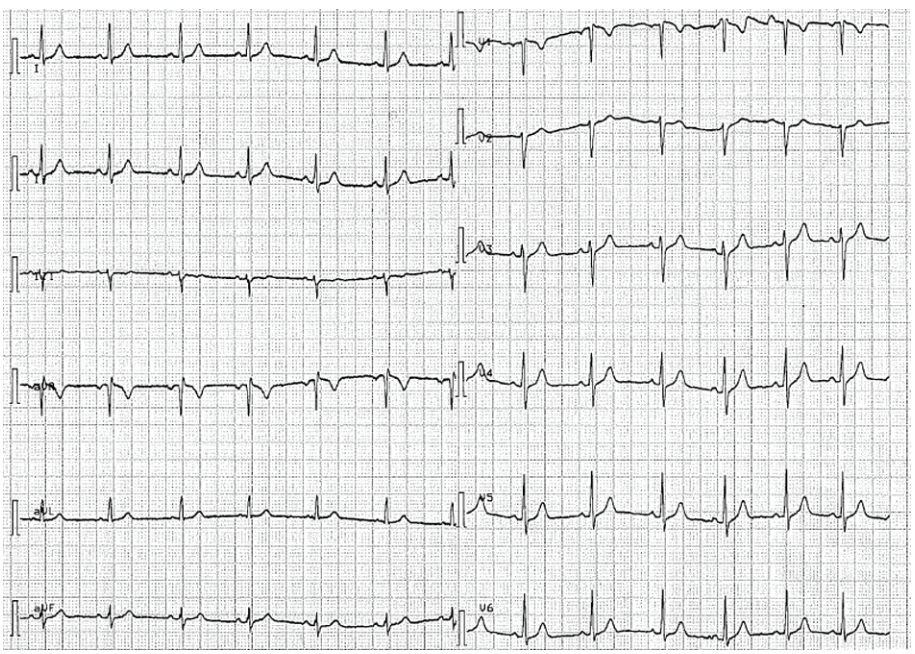

Figure 2. 12-lead electrocardiogram after termination of tachycardia.

potential neuro-protective agent through its ability to block N-methyl-D-aspartate (NMDA) receptors. NMDA receptors have been implicated in mediating excite-toxicity in the basal ganglia, a process that has been linked to dopaminergic neuronal cell death in Parkinson's disease. Potential adverse effects of amantadine use include mental status changes, lower extremity edema, and livedo reticularis.[4] However in acute overdoses, amantadine toxicity primarily results in cardiovascular toxicity manifested as QRS widening, QT prolongation, and ventricular dysrhythmias.[5,6] Schwartz et al.[7] also reported a patient with acute amantadine intoxication (ingestion of 10 gr Amantadin), leading to pulseless ventricular tachycardia which was terminated with defibrillation. Salata et al. investigated the cardiac effects of amantadine in an experimental study on isolated ventricular myocardial tissues.[8] They reported that amantadine can directly alter the membrane properties of ventricular muscle, possibly due to an effect on potassium conductance. RVOT- VT typically arises from the outflow tract of the right ventricle, resulting in a LBBB morphology with a right inferior frontal axis. Idiopathic RVOT-VT usually occurs when sympathetic nervous system activity is increased.[9,10] In our case RVOT-VT may have been induced by the amantadine directly affecting ventricular myocardial tissues and an increase in the sympathetic nervous system activity. Previous cases reporting on amantadine and cardiac arrhythmias concern toxic levels of the drug, and arrhythmias are commonly fatal polymorphic ventricular tachycardias. To our knowledge, this is the first case reporting the association between amantadine and RVOT-VT.

To the best of our knowledge, this is the first case in the literature to describe RVOT-VT after amantadine intake. RVOT-VT and other cardiac arrythmias may be caused by amantadine.

Conflict-of-interest issues regarding the authorship or article: None declared.

REFERENCES

1. Sartori M, Pratt CM, Young JB. Torsade de Pointe. Malignant cardiac arrhythmia induced by amantadine poisoning. Am J Med 1984;77:388–91. CrossRef
2. Cook PE, Dermer SW, McGurk T. Fatal overdose with amantadine. Can J Psychiatry 1986;31:757–8.
3. Simpson DM, Ramos F, Ramirez LF. Death of a psychiatric patient from amantadine poisoning. Am J Psychiatry 1988;145:267–8. CrossRef
4. Tsai MC, Mansour NA, Eldefrawi AT, Eldefrawi ME, Albuquerque EX. Mechanism of action of amantadine on neuromuscular transmission. Mol Pharmacol 1978;14:787–803.
5. Pimentel L, Hughes B. Amantadine toxicity presenting with complex ventricular ectopy and hallucinations. Pediatr Emerg Care 1991;7:89–92. CrossRef
6. Yang CC, Deng JF. Anticholinergic syndrome with severe rhabdomyolysis-an unusual feature of amantadine toxicity. Intensive Care Med 1997;23:355–6.
7. Schwartz M, Patel M, Kazzi Z, Morgan B. Cardiotoxicity after massive amantadine overdose. J Med Toxicol 2008;4:173–9. CrossRef
8. Salata JJ, Jalife J, Megna JL, Alperovich G. Amantadine-induced diastolic depolarization and automaticity in ventricular muscle. Circ Res 1982;51:722–32. CrossRef
9. Hayashi H, Fujiki A, Tani M, Mizumaki K, Shimono M, Inoue H. Role of sympathovagal balance in the initiation of idiopathic ventricular tachycardia originating from right ventricular outflow tract. Pacing Clin Electrophysiol 1997;20:2371–7.
10. Yoshida A, Inoue T, Ohnishi Y, Yokoyama M. Heart rate variability before spontaneous episodes of ventricular tachycardia originating from right ventricular outflow tract in patients without organic heart disease. Jpn Circ J 1998;62:745–9. CrossRef

Key words: Amantadine; Parkinson disease; tachycardia.

Anahtar sözcükler: Amantadin; Parkinson hastalığı; taşikardi.