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Carbamazepine-induced atrioventricular block in an elderly woman

Yaşlı bir kadın hastada karbamazepine bağlı atriyoventriküler blok

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Summary– An 88-year-old woman was admitted to the emergency department after experiencing syncope while in a sitting position. Electrocardiogram showed advanced degree heart block. She has been on low-dose carbamazepine (200 mg/day) for the last year for trigeminal neuralgia (TN). After discontinuation of carbamazepine, the patient returned to normal sinus rhythm.

Özet– Seksen sekiz yaşında bir kadın hasta acil servise oturur iken bayılma şikayeti ile başvurdu. Elektrokardiyogramında ileri derecede kalp bloğu görüldü. Trigeminus nevraljisi için son bir yıldır günde 200 mg dozunda karbamazepin almakta imiş. Karbamazepin kesildikten sonra hastada kalp bloğu ortadan kalktı ve hasta başka bir girişim yapılmadan taburcu edildi.

Carbamazepine is commonly used for the treatment of painful neuropathies, seizure disorders, and trigeminal neuralgia (TN). Bradyarrhythmia and atrioventricular (AV) conduction block rarely develop as adverse cardiac events, particularly in elderly women who are on carbamazepine, even with low plasma concentrations.[1] Since this age group is also susceptible to degenerative conduction system disturbances, it is crucial to evaluate the patient carefully before any attempt of permanent pacemaker implantation.

Abbreviations:

AV	*Atrioventricular*
ECG	*Electrocardiogram*
ED	*Emergency department*
TN	*Trigeminal neuralgia*

CASE REPORT

An 88-year-old woman was admitted to the emergency department (ED) experiencing syncope while in a sitting position. She had a past medical history of TN and diabetes. She did not have any complaints of chest pain or dyspnea. She was on 200 mg/day of carbamazepine and metformin. She was alert and cooperative. Her body temperature was 36.7°C and blood pressure 120/80 mmHg. The electrocardiogram (ECG) recorded in the ambulance during her transfer to the ED showed advanced atrioventricular (AV) block (Figure 1). Her ECG at the ED showed Mobitz type I AV block and 2:1 AV block (Figure 2). She was admitted to the Department of Cardiology for continuous ECG monitoring. Her carbamazepine serum concentration was 2.7 mcg/ml (reference: 4–12 mcg/ml). Despite normal levels of serum carbamazepine, her carbamazepine treatment was stopped immediately. Her blood work including electrolytes, troponin, and thyroid hormone levels were within normal limits. The following day, ECG showed normal sinus rhythm without signs of conduction disturbances. ECG did not show any abnormality. After 4 days of hospital stay, she was discharged with normal ECG, PR interval, and QRS duration. The family did not consent to electrophysiology study. After 5 months of follow-up, she did not experience another episode of syncope or display evidence of AV block on ECG.

DISCUSSION

Carbamazepine induces 2 forms of arrhythmia: sinus tachycardia in patients with toxic ingestion of carbamazepine and, rarely, bradyarrhythmia or AV conduction disturbances in the setting of modestly elevated,

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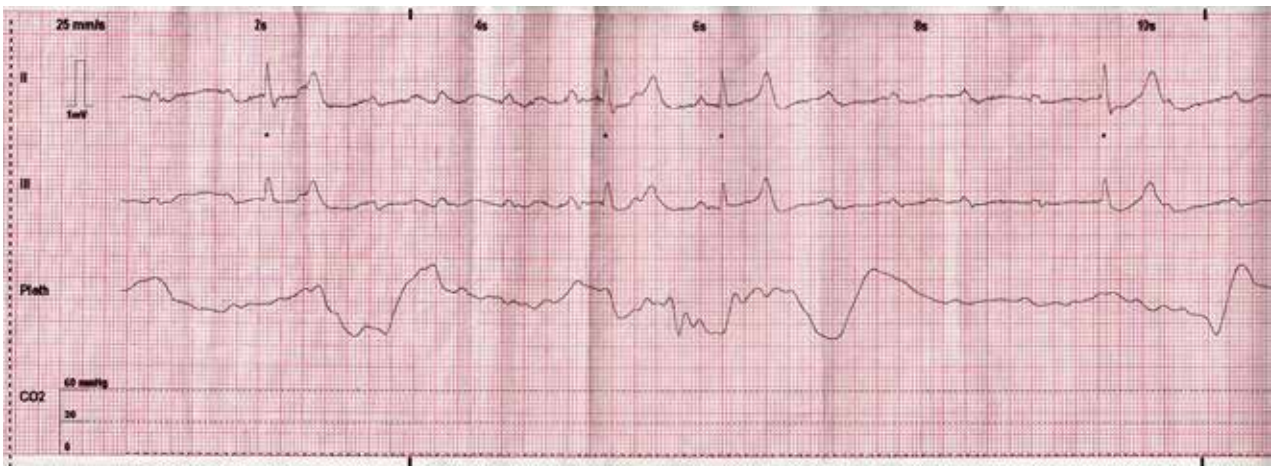

Figure 1. ECG obtained in the ambulance before patient's arrival to the ED, showing advanced degree AV block.

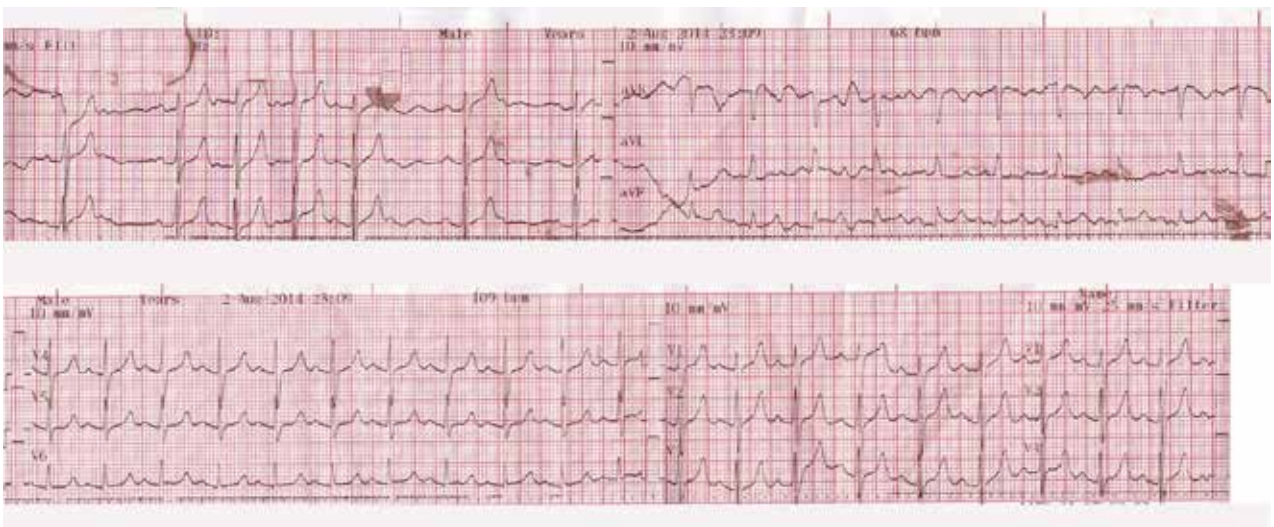

Figure 2. ECG at the ED showed Mobitz type I AV block, 2:1 AV block, and prolonged PR interval of 200 ms when there is 1:1 AV conduction.

therapeutic, or even sub-therapeutic drug levels.[2] The latter group is reported to consist almost exclusively of elderly women.[2] As in our case, AV block can develop after long periods of therapy. Therefore, the evaluating cardiologist may overlook the association of this drug with AV block, which is mostly prescribed by neurologists.

Labrecque et al.[3] and Ide et al.[1] reported 2 AV complete heart block cases induced by carbamazepine after 3 years and 1 year, respectively. Both patients were elderly females on 200 mg/day maintenance dose. The drug concentration of Ide et al.'s patient was below therapeutic level, as in our case. Kasarskis et al.[2] analyzed 26 patients presenting with bradyarrhythmias and AV conduction delay during the course of routine treatment of seizure disorder or TN with carbamazepine. They found that 81% of the group were female and that the majority of the cases (19 of 26 patients, 73%) either had carbamazepine blood levels in the therapeutic range or were using the drug in the traditional dose range. Eight (31%) of these patients required vasopressors and/or cardiac pacemakers as part of their acute treatment.

Kasarskis et al.[2] reported a 58-year-old woman who presented with disturbance of cardiac conduction system and modestly elevated carbamazepine level. The causal relationship linking carbamazepine was further supported by the reappearance of conduction

disturbance after reinstitution of the drug. The authors performed cardiac electrophysiology study after the second event, provided the patient had discontinued carbamazepine for a sufficient time and all measurements of the cardiac conduction system were within normal limits.

In 1970, Steiner et al.[4] studied the electrophysiological effects of carbamazepine on dog hearts and showed negative effects on AV conduction and ventricular automaticity. There was depression in phase 4 depolarization and decrease in firing rate of spontaneously active Purkinje cells. Beermann et al.[5] reported aggravation of advanced AV block in 1 patient presenting with Mobitz type II block.

The cause of bradyarrhythmia preponderance in elderly patients, particularly those aged >50 years, is not presently known. Based on the reported cases of carbamazepine-induced cardiac arrhythmias in the elderly, Kasarskis et al.[3] recommended obtaining baseline ECG in patients >50 years before initiation of carbamazepine therapy and avoiding use of the drug in patients in whom conduction disturbance is already present or likely to occur. They suggest further evaluation for cardiac conduction disturbances in epileptic patients who experience syncopal events on carbamazepine treatment.

In conclusion, before attempting any invasive procedure such as permanent pacemaker implantation for complete AV block, patient medications, and the association of cardiac conduction disturbances and carbamazepine–even years after its initiation with normal or low plasma levels–should be considered, particularly in elderly women.

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

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