ELECTROCARDIOGRAPHIC DEPOLARIZATION ABNORMALITIES CAUSED BY AMITRIPTYLINE INTOXICATION

AMİTRİPTİLİN İNTOKSİKASYONUNA BAĞLI ELEKTROKARDİYOGRAFİK DEPOLARİZASYON ANOMALİSİ

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ABSTRACT

Tricyclic antidepressants protect their importance among the emergency department visits. Amitryptiline, one of the tricyclic antidepressants, shows its effects by inhibiting the reuptake of epinephrine and serotonin from the adrenergic and serotonergic neurons by membrane pump inhibition. Performing its toxic effects on heart by using a similar mechanism with quinidine, amitriptyline slows down the intraventricular conduction through the inhibition of fast sodium channels on His bundle and Purkinje fibers. As a result, it is known that the drug causes primarily the QRS prolongation and also PR and QT prolongation, multifocal ventricular premature beat, ventricular tachycardia and fibrillation. Herein we report a case of suicide attempt which has T negativity as electrocardiographic (ECG) change caused by amitriptyline intoxication.

Key words: *Amitriptyline; intoxication; electrocardiogram changes.*

ÖZET

Trisiklik antidepresanlar acil servis pratiğinde hala önemini koruyan bir konudur. Trisiklik antidepresanlardan biri olan amitriptilin etkisini adrenerjik ve serotonerjik nöronlarda epinefrin ve serotoninin geri alımını membran pompasını inhibe ederek göstermektedir. Kalp üzerine olan toksik etkisi, kinidinin etkisine benzer bir şekilde, His demeti ve Purkinje liflerinde hızlı sodyum kanallarının inhibisyonu ile intraventriküler iletiyi yavaşlatması şeklinde ortaya çıkar. Bunun sonucu olarak öncelikle, ilacın QRS uzaması, PR ve QT uzaması, multifokal ventriküler prematüre atım, ventriküler taşikardi ve fibrilasyona neden olduğu bilinmektedir. Bu yazıda elektrokardiyografik (EKG) değişiklik olarak T negatifliği görülen bir intihar girişimi amaçlı alınan amitriptilin zehirlenmesi olgusu sunmaktayız.

Anahtar kelimeler: *Amitriptilin; intoksikasyon; elektrokardiyogram değişikliği.*

INTRODUCTION

Tricyclic antidepressants protect their importance among the emergency department visits (1). Severe intoxications caused by tricyclic antidepressants could result in death. The majority of the deaths occur in the first few hours after the drug intake. Therefore, first approach to patient in emergency department becomes more of an issue. By administrating the appropriate interventions in emergency departments, mortality could be decreased in a significant manner (1).

Amitriptyline is one of the most prescribed tricylic antidepressant by physicians. Since its high effectivity and low cost, it is oftenly prescribed by doctors and also patients can acquire it easily without any prescription (2). The emergence of mortal consequences by irregular usage of the drug, accidental and suicidal over-intakes, the increase in amitryptiline intoxication ratios, raises the importance of the subject (3).

Besides the toxic effects on many systems, the most important and life threatening side-effects of amitryptiline intoxication are seen on cardiovascular system. Therefore, every patient who is brought to emergency department with this complaint or is to be suspected, must be evaluated with detailed cardiac examination (4).

Herein we report a case of suicide attempt which has T negativity as electrocardiographic (ECG) change caused by amitriptyline intoxication.

CASE REPORT

A 19-year-old female patient who did not have any previous complaints, attempted suicide by taking 20 pills of 25 mg tablet of amitryptiline, which belonged to her grandmother, after having a discussion with her family about her boyfriend and applied to emergency department one hour later. After the patient, who did not have any complaints at the application to the emergency department, stated the oral intake of drugs, considering the drug intoxication, nasogastric catheter is placed for gastric irrigation and active coal is administered. On arrival Glasgow Coma Scale was 15, heart rate was 95 beats/min and blood pressure was 195/95 mmHg. On the physical examination and laboratory evaluations, except hypertension no pathological results were found. Because of the ECG performed in emergency department showed T negativity on D_{III} and on aVF, biphasic T waves on V_{3-4} and QTc:481msec (>440msec, prolonged), the patient is taken to the intensive care unit for close monitorisation (**Figure 1**).

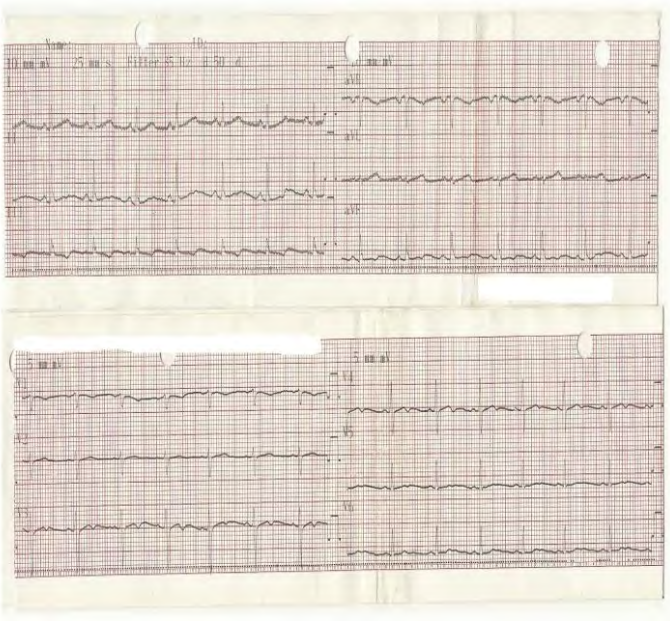
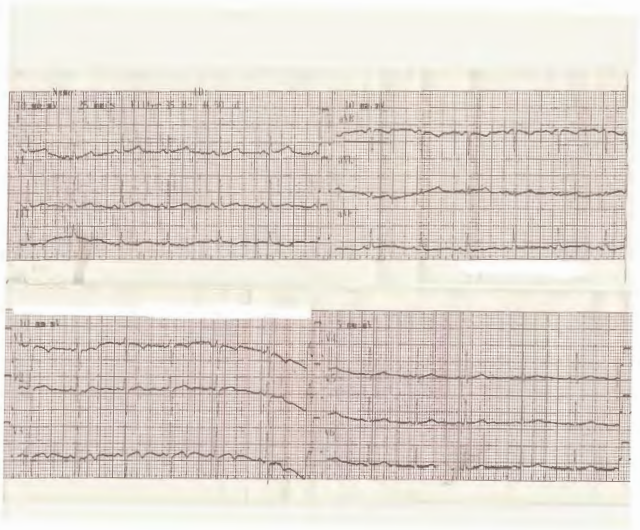


Figure :*1T negativity on DIII and on aVF, biphasic T waves on V3-*

At the 6th hour of observation the depolarization anomalies pervaded further; on D_{II}, D_{III}, aVF and V_{3-6} T negativities and biphasic T waves were seen and QTc:524msec (**Figure 2**).

Figure 2: *depolarization anomalies on DII, DIII, aVF and V3-6 T negativities and biphasic T waves.*

At the 24th hour of observation only on D_{III} and V_3 T negativities and biphasic waves were seen and QTc: 410msec (**Figure 3**).



Figüre 3 : *DIII and V3 T negativities and biphasic waves*

The patient whose ECG parameters were recovered on the 3rd day of observation and who did not have any complaints, was released after 2 more days of observation in the service (**Figure 4**).

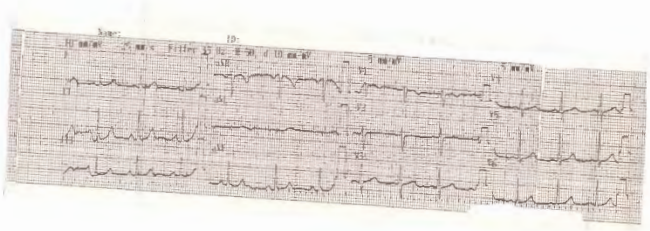


Figure 4*: recovered ECG parameters.*

DISCUSSION

The therapeutic dose range for tricyclic antidepressants is 1-5 mg/kg. Obtaining larger doses than this range can cause acute toxication. While swallowing doses especially more than 10mg/kg causes life threatening intoxication. Severe toxicity may seen especially in children, older patients and people who have cardiac illness in lower doses (1).

Amitryptiline, which is one of the tricyclic antidepressants, shows its effects by inhibiting the reuptake of epinephrine and serotonin from the adrenergic and serotonergic neurons by membrane pump inhibition. Tachycardia, hypotension, dilated pupils, mouth dryness and urinary retention are also occured by this path. As a result of the effects on central nervous system, hallucination, agitation, convulsion and coma can be seen. The cardiac effects, which influences the mortality rates the most, are tachycardia, depolarization anomalies, QRS complex widening on ECG and several arrythmias (5,6).

Performing its toxic effects on heart by using a similar mechanism with quinidine, amitriptyline slows down the intraventricular conduction through the inhibition of fast sodium channels on His bundle and Purkinje fibers. As a result, it is known that the drug causes primarily the QRS prolongation and also PR and QT prolongation, multifocal ventricular premature beat, ventricular tachycardia and fibrillation (5,6).

In case of severe intoxications, all types of arrhythmias, respiratory depression, seizures, coma and even death could

happen (7,8). Severe intoxication is generally seen in 6 hour after drug-intake. The death caused by tricyclic antidepressant intoxication can be seen in the first few hours after drug-intake. Although fatal arrhytmias can occur due to tricyclic antidepressants, the mortality rates are low (9).

Epileptic seizures that are generally in tonic-clonic type may seen after large doses of intake. It is stated that after the blood plasma levels of tricyclic antidepressants exceeds 1000 ng/ml, cardiotoxicity and seizures can occur (1). Amitryptiline poisoning is generally seen in little children as an accident and in teenagers as a purpose of suicide. When it is taken in large doses, it can be resulted in life threatening arrhytmias, convulsion, coma and death. Other than the remedies like gastric lavage, active coal, fluid replacement, bicarbonate, lidocaine and diazepam, there is no specific antidote (10).

For the diagnosis, plasma levels of the drug is the most used method for now. But for technical reasons plasma levels of the drug could not be measured in our case. There has not been a parameter found that can determine the prognosis yet. Although the lethal dose is generally more than 1-3 grams, there has been reported deaths even after one pill intake, or against it there has been reported cases that have not developed any problems after over 4 grams of intake (10,11). The lower toxicity symptoms that is seen in our case could be related to the differences of drug metabolisms between people (12). Another cause may be, the possibility of drug's first pass elimination from liver faster than normal population, could have reduced the toxicity signs in our patient.

OUTCOME

In conclusion, as amitryptiline intoxication can also occur without any clinical symptoms and only ECG changes, it must be considered that the patients who applied to emergency department should be examined carefully and during the patients' follow-up depolarization anomalies and QTc periods may also be used .

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