

Loss of Consciousness and Seizure in Patient with Tricyclic Antidepressant Poisoning and with Atypical ECG Changes

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Abstract: Antidepressants can be abused for committing suicide despite effectiveness in treatment of depression. Tricyclic Antidepressants (TCA) were considered the first line of treatment for depression. A 23-year-old woman brought to emergency department by EMS personnel due to convulsion and loss of consciousness. She had taken 90 of pills (Amitriptyline 75 mg) at once to commit suicide. The patient was intubated and connected to the mechanical ventilator and admitted to the women's toxicity ICU. Over 48-72-hour hospitalization, ECG changes persistent. In this case, ECG changes were in the form of LBBB over view with wide QRS (160 msec) and long QTC (520 msec). But, the R/S ratio above 0.7 and RAD was not observed in patient's ECG. In the 4th hospitalization day, QRS waves began to narrow, and on the 5th day, the patient's ECG returned to normal completely. In drug poisonings, there are a series of clinical and para-clinical manifestations that can help in the diagnosis of patient. Management of patients should not only rely on clinical or para-clinical signs. In TCA poisoning, ECG changes have no single pattern and can lead to a variety of changes and can also persist for days after poisoning despite the clinical recovery.

Keyword: Tricyclic Antidepressants; Electrocardiography; Left Bundle Branch Block; Suicide

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1. Introduction

Suicide is a major mental health problem mainly observed in people with a history of mental disorders. Consequently, the successful treatment of psychiatric disorders, especially depression, is considered as a prevention method regarding this problem. Interestingly, antidepressants can be abused for committing suicide despite effectiveness in treatment of depression (1). Until recently, Tricyclic Antidepressants (TCA) were considered the first line of treatment for depression. However, their use has declined because newer antidepressants have been

produced with lower side-effects (2). Clinical and laboratory signs, particularly ECG changes, in TCA toxicity are diverse and extensive (3).

2. Case presentation

2.1. Case Introduction and Clinical Findings

A 23-year-old woman brought to emergency department by EMS personnel due to convulsion and loss of consciousness. According to history registered, the last night admission, the patient presented with lethargy, dizziness, flushing, and nausea, as described with her family. She also disclosed that 30 minutes earlier, she had taken 90 of her mother's pills (Amitriptyline 75 mg) at once to commit suicide. No action was taken at home until the patient had lost consciousness, followed by tonic-clonic seizure movements. With this presentation, the patient was re-

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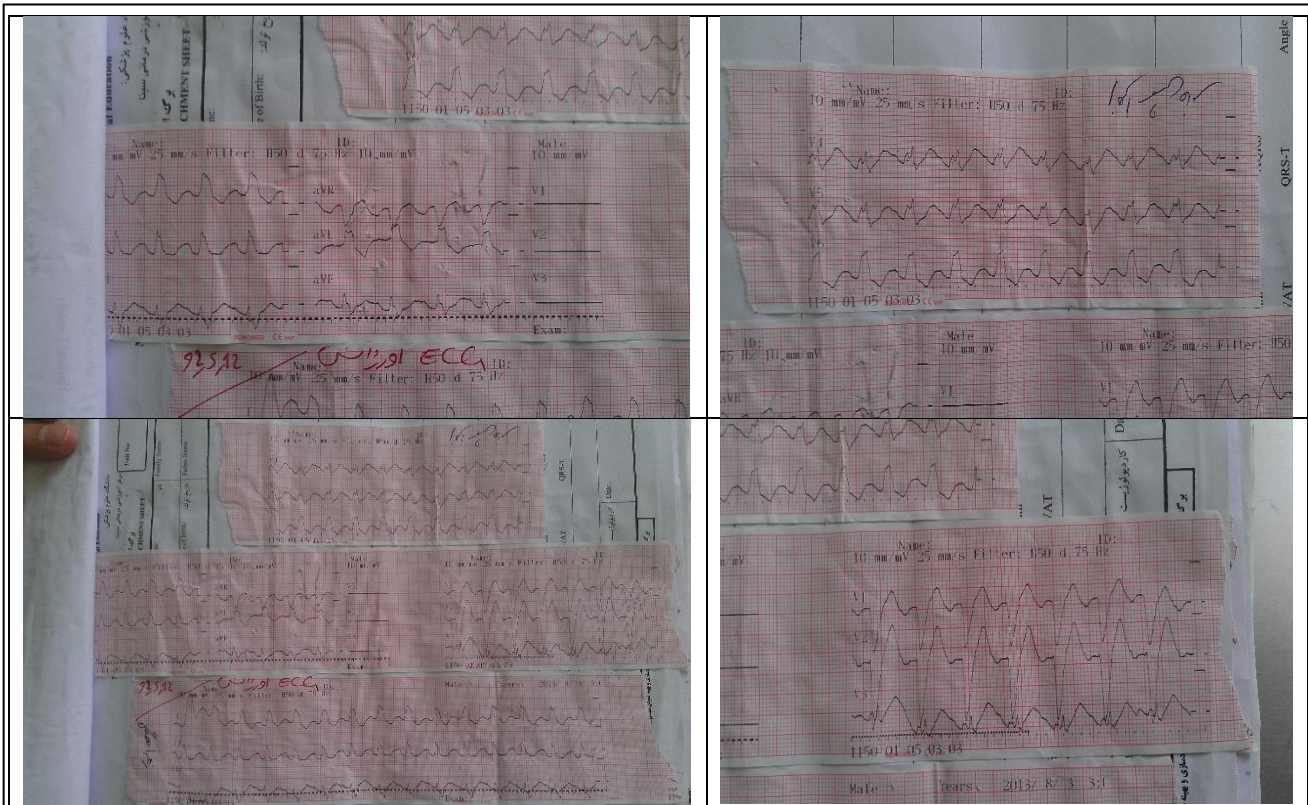


Figure 1: The results of initial ECG recorded in the emergency department.

ferred to a clinic in her town, where she was resuscitated with fluids, her seizure was controlled, NG Tube used for her, and activated charcoal was administered before she was transferred to Sina Hospital (reference center for intoxicated patients). Time passed between taking the drug and admission to the clinic is unknown. On admission, the patient had loss of consciousness and immediately transferred to CPR ward and CPR began for her (intubated and Sodium bicarbonate administered for her)..

2.2. History and Assessment

Patient's history was include:

History of migraine headaches, anemia, and sinusitis; history of irregular use of herbal medicines for migraine.

Vital signs: blood pressure=95/80 mmHg; RR=16/min Oxygen saturation=83% with O₂ mask; pulse rate=126/min; body temperature=36.7; Glasgow coma scale=7.

Heart, lung, abdomen physical exams were normal, pulses of all 4 limbs were symmetrical But 1 plus, miotic pupils had a weak response to light and DTRs were symmetrical and decreased, with double flexor plantar. Also, the results of tests were WBC=10400, Na=139, K=3.8, BUN=0.8, Hb=11.5, Platelet=264000, ABG PH=7.4: PCO₂=49, HCO₃=30 and LBBB was evident in the initial ECG recorded in the emergency (Fig1.).

2.3. Therapeutic Intervention, Follow-up and Outcomes

Sodium bicarbonate was administered for the patient as a bolus and maintenance. The patient connected to the mechanical ventilator and admitted to the women's toxicity ICU. The patient was gradually disconnected (wean) from the ventilator and regained her previous level of consciousness. However, over 48-72 hour hospitalization, ECG changes continued. Cardiology consultation and echocardiography performed and normal results reported. After 120 hours, ECG returned to normal, and after psychiatric counselling, the patient discharged.

3. Discussion

Tricyclic antidepressants are primarily applied in the treatment of major depression. Other indications for TCAs comprise obsessive-compulsive disorder, panic and phobia disorders, and anxiety and eating disorders (4). TCAs are also used in the treatment of some physical diseases such as chronic pain syndrome, peripheral neuropathy, enuresis, and migraine headaches (3). Between antidepressants, TCAs are more frequently used for suicide. The toxic mechanism of TCAs relies on their pharmacological effects which comprise anti-cholinergic, anti-adrenergic, adrenergic reuptake inhibition, sodium channel block, and sodium channel block similar to quinine effect in the heart (5). Antagonistic effects in potassium channel and Gamma-Amino-Butyric Acid (GABA) receptors have also

been suggested (3). Depolarization of the myocardial membrane is delayed through sodium channel blocking, which prolongs P-R interval, QRS, and QT. Ventricular tachycardia and sinus tachycardia may also be observed (6). As ECG changes are normal immediately after taking TCAs, and abnormal ECG changes occur a few hours later, consequently, with suspected TCA poisoning, ECG should be frequently repeated. Furthermore, ECG changes due to TCA poisoning usually return to normal after treatment with sodium bicarbonate, but the changes may persist up to 72 hours (7, 8). Seizures are observed in more than 0.05% of patients in association with prolonged QRS (2). The patient also had a seizure as part of symptoms, which is associated with prolonged QRS wave. Veris-van Dieren (2007) also introduced two patients with TCA poisoning and initial clinical presentation of loss of consciousness (4). ECG changes in TCA poisoning can predict arrhythmia, seizure, and even death in such patients. However, its validity is not definitive now (9). These changes include; R/S ratio: QTC>430msec, QRS>100-120 msec in aVR greater than 0.7 (R wave>0.3msec) with RBBB and RAD within 120-270 range (2, 9). However, the R/S ratio in aVR lead has greater predictive effects concerning TCA side-effects (10, 11). In this case, ECG changes were in the form of an LBBB overview with wide QRS (160msec) and long QTC (520msec). But, the R/S ratio above 0.7 and RAD was not observed in patient ECG.

Niemann JT (1986) revealed that RBBB is the most common conductive disorders observed in TCA poisoning (6). Meanwhile, LBBB has been determined as a conductive disorder pattern in patients' ECG. In this patient, the LBBB pattern can help the previous history of cardiac diseases, but there is a poor chance of any underlying cardiac diseases since the patient's history did not show any particular previous diseases and had normal echocardiography during hospitalization. Brugada pattern is seen in TCA poisoning (as RBBB with ST elevation in V1-3), which does not respond to treatment with sodium bicarbonate, except in rare cases (12). Recovery time from ECG disorders is varied and dependent upon the severity of poisoning. It is usually resolved in 36-48 hours. Treatment with sodium bicarbonate reduces cardiac effects (12). Contrary to previous studies, in this case, ECG changes lasted up to 120 hours after hospitalization. Despite the clinical recovery, no recovery in ECG was observed although the treatment with sodium bicarbonate was done to bring blood and urinary pH to 7.5 and 6.5, respectively. Unlike the common TCA poisoning pattern that is RBBB, LBBB was the dominant ECG pattern in this patient. So, it could potentially represent an underlying cardiac disease (congenital or acquired). Accordingly, cardiology consultation and echocardiography were performed, which provided no pathological results. In the 4th hospitalization day, QRS waves began to narrow, and on

the 5th day, the patient's ECG returned to normal completely.

4. Conclusion

In drug poisonings, there are a series of clinical and para-clinical manifestations so that can help in the diagnosis of the intoxication. Management of patients should not only rely on clinical or para-clinical signs. In TCA poisoning, ECG changes have no single pattern and can lead to a variety of changes and can also persist for days after poisoning despite the clinical recovery.

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6. Conflict of interest

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8. Author contribution

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