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Acute Drug Poisoning with QTc Prolongation due to Ingestion of Crushed Dumpling-Form Medications–A Case Report

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Abstract

Drug-induced corrected QT interval (QTc) prolongation is a recognized risk factor for torsades de pointes (TdP), a potentially fatal arrhythmia. This report presents a case involving 36-year-old woman with a history of depression and recent overdose attempt. On discovery, the patient was found unconscious, with solid substances adhering to her hands and similar substances present in a cooking bowl. No empty drug packaging was observed at the scene. Acute drug poisoning was suspected, and the patient was transported to our hospital. Electrocardiography revealed a prolonged QTc interval of 483 ms, suggesting drug-induced QT interval prolongation. Urine drug screening was positive for benzodiazepines. The patient later disclosed that she had crushed and ingested her prescribed medications, including escitalopram oxalate, quetiapine fumarate, and famotidine, all of which are associated with QTc prolongation. The respective half-lives were found to be 27–32 hours for escitalopram oxalate, 6–7 hours for quetiapine fumarate, and 2–4 hours for famotidine. Gastric decontamination was initiated, and the QTc interval normalized after more than 32 hours. This case is notable for the unique ingestion method, as prior reports of medication ingestion in dumpling form were not found. This underscores the need for healthcare providers to consider atypical ingestion methods in overdose cases. Additionally, rapid electrocardiographic assessment and close electrocardiogram (ECG) monitoring, with attention to the drug half-life, are essential in preventing potential life-threatening arrhythmias.

Keywords: Corrected QT interval prolongation; Overdose; Dumpling-form ingestion; Drug half-life; Electrocardiogram monitoring

Introduction:

Drug-induced QT prolongation occurs when exposure to certain drugs inhibits major ion channels, particularly the potassium rectifier current, which subsequently alters the myocardial currents involved in generating the QT interval [1]. QT prolongation is defined as a QT interval exceeding 460 milliseconds (ms) or a corrected QT (QTc) interval exceeding 440 ms when adjusted for the RR interval. This prolongation heightens the risk of life-threatening torsades de pointes (TdP), which may result in sudden cardiac death [2]. Drugs associated with significant QT prolongation include Class III antiarrhythmics, sodium channel blockers, antidepressants, antipsychotics, and the antiemetic serotonin antagonist ondansetron [3]. Here we present a rare case of acute drug intoxication where no empty drug packages were found. The drug had been ingested in a crushed dumpling form, and a 12-lead electrocardiogram (ECG) indicated drug-induced QT prolongation.

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Case Presentation

A 36-year-old woman with a medical history of depression, obsessive-compulsive disorder, and multiple prior overdose attempts made a distress call to her mother at 9:00 a.m. Upon arrived at the patient's residence, the mother found the door locked and contact the police, who gained entry approximately an hour later. The patient was found unconscious, with solid substances adhering to both hands and similar material present in a cooking bowl (Figure 1). No empty drug packaging was discovered at the scene. Due to her unresponsive condition, acute drug poisoning was suspected, and she was transported to our hospital at 11:00 a.m.

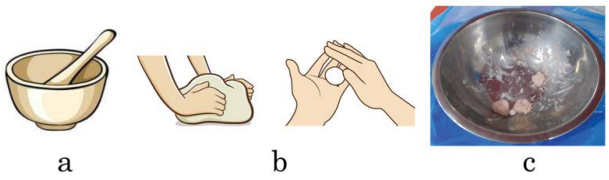

Figure 1: The patient crushed her prescribed oral medications (1a), dissolved them in water, and molded into a dumpling form (1b,1c).

On arrival, her Glasgow Coma Scale (GCS) score was E1V5M5. Vital signs were as follows: blood pressure, 111/74 mmHg; heart rate, 79/min; respiratory rate, 17/min; and oxygen saturation (SpO_2), 95% on room air. Blood tests revealed no significant abnormalities. Chest and abdominal radiographs showed no abnormalities. Electrocardiography showed a heart rate of 101/min and a prolonged QTc of 483 ms (Figure 2). A urine drug screening test was positive for benzodiazepines (BZO).

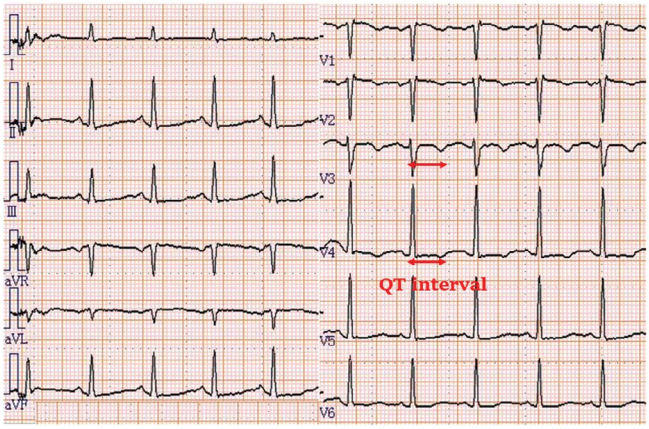

Figure 2: Initial electrocardiography showed a prolonged QTc interval of 483 milliseconds.

The patient later disclosed that she had crushed her prescribed oral medications, dissolved them in water, shaped them into dumplings, and ingested them (Figure 1a–c). Subsequently, multiple empty medication packages were found at the patient's residence (Table 1). Escitalopram oxalate, quetiapine fumarate, and famotidine are among the medications likely to contribute to QTc prolongation.

Table 1: The medications this patient had crushed.

		Oral LD 50**	Harf-life**
Escitalopram Oxalate*	10mg 52T	500 mg/kg	27-32 h
Suvorexant	20mg 44T	1200 mg/kg	12 h
Quetiapine Fumarate*	25mg 36T	2000 mg/kg	6-7 h
Trazodone Hydrochloride	50mg 28T	690 mg/kg	7-8 h
Famotidine*	10mg 20T	4049 mg/kg	2-4 h
Loxoprofen Sodium Hydrate	60mg 21T	145 mg/kg	15 h
Lorazepam	0.5mg 26T	1850 mg/kg	14 h
Pregabalin	75mg 22T	1600 mg/kg	6.3 h
*: potential cause of QTc prolongation			
**: DRUGBANK online or Safety Data Sheet			

A gastric tube was inserted, and the patient was given 30 g of activated charcoal and 50 g of magnesium citrate. By Day 2, the QTc prolongation had improved. The patient was later discharged under psychiatric care.

Discussion

Our case was rare in that the patient ingested multiple oral medications molded into dumpling form, complicating identification at the scene due to unconsciousness and lack of packaging. Upon presentation, the patient's vital signs, including blood pressure, heart rate, and respiratory rate, were stable. In cases of suspected acute poisoning, determining the causative agent typically involves urine drug screening with an immunochromatographic assay (IVeX Screen M-1,®, Biodesign Inc., Tokyo, Japan) [4]) or toxidrome assessment [5,6]. However, QTc measurement via a 12-lead ECG is also critical. Normal QTc intervals are <450 ms in men and <460 ms in women, with arrhythmia risk increasing by 5% per 10 ms increment [7]. Specifically, TdP, a type of polymorphic ventricular tachycardia, associated with QTc prolongation, can progress to fatal ventricular fibrillation [8,9]. Notably, a prolonged QTc interval, particularly one exceeding 500 ms, warrants investigation into potential underlying conditions, such as congenital QT prolongation syndrome, cardiomyopathy, or severe intracranial disease. This evaluation should include identifying and discontinuing potential causative agents, monitoring electrolyte levels, and tracking QTc until normalization [9]. Our patient exhibited a QTc of 483 ms upon arrival, indicating potential medication-induced QT prolongation and necessitating continuous ECG monitoring due to TdP risk.

Medications known to prolong the QTc interval include class III antiarrhythmics, sodium channel blockers,

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antidepressants, and antipsychotics [10]. In this case, the overdose involved three medications: escitalopram oxalate, a selective serotonin reuptake inhibitor and antidepressant; quetiapine fumarate, an atypical antipsychotic; and famotidine, a histamine H2 receptor antagonist [10]. However, the package inserts report unknown frequencies of QTc prolongation for these drugs. Conversely, pharmacokinetic data from the DRUGBANK [11] indicated varying half-lives of 27–32 hours for escitalopram oxalate [12], 6–7 hours for quetiapine fumarate [13], and 2–4 hours for famotidine [14]. Given the patient's young age (36 years) and absence of liver or renal dysfunction, we considered drug half-life as a clinical safety indicator. After 32 hours of continuous 12-lead ECG monitoring, the patient was discharged with confirmed QTc interval improvement. Therefore, careful ECG monitoring and consideration of drug-half are essential in managing drug-induced QTc prolongation.

In this case, the patient ingested 249 tablets of nine different drugs by crushing and forming them into dumplings. There have been several reports of large quantities of tablets being crushed and ingested [15-17]. Klein-Schwartz et al. [15] documented cases of methylphenidate tablet abuse where tablets were crushed and either injected or inhaled for euphoria, while Aquina et al. [16] reported the crushing and snorting of OxyContin delayed-release tablets. Jalali et al. [17] described the practices of crushing and smoking hyoscine/scopolamine tablets. In these cases, crushing aimed to increase absorption rate or facilitate large single-drug doses. Conversely, the crushing of multiple drugs and their formation into dumplings, as seen in this case, enables simultaneous administration of multiple drugs while concealing their type and quantity from medical staff. Our PubMed search yielded no reports describing this method. This case is unique as the patient, with a history of multiple overdoses, ingested a large multi-drug dose by forming dumplings. Rapid assessment of overdose based on vital signs and ECG findings is crucial when managing cases where medications are ingested in altered forms.

Conclusion

In cases of medication overdose presented in various forms, prompt ECG evaluation and treatment are crucial.

Disclosure Statement

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