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Case Report

Olanzapine Induced Supraventricular Tachycardia (SVT)

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ABSTRACT

Olanzapine is one of the most widely used atypical antipsychotics. Initial years of promise were belied with emerging evidence of metabolic complications. Despite these adverse effects, olanzapine continues to be widely prescribed and generally considered safe in patients who do not have metabolic risk factors. We report the case of a 47-year-old female patient admitted for an acute psychotic episode treated with a therapeutic dose of olanzapine who developed supraventricular tachycardia (SVT) with cardiovascular compromise. Though considered safe, with QTc prolongation reported in less than 0.1% of patients, olanzapine can in rare instances be associated with cardiac conduction abnormalities. Our patient had no preexisting cardiac illness and her ECG during admission showed no evidence of abnormality. To our knowledge, this is the first case report of olanzapine inducing SVT in the therapeutic dose range.

KEYWORDS: Adverse effects, Olanzapine, Supraventricular tachycardia.

INTRODUCTION

Introduced in 1996, olanzapine was the second atypical antipsychotic drug to be marketed after clozapine. Though FDA approved for only schizophrenia, bipolar disorder and augmenting antidepressants in treatment-resistant depression, it is widely prescribed for various psychiatric conditions and is one of the most prescribed antipsychotics worldwide [1]. Promoted to be a safer alternative to first-generation antipsychotics, olanzapine has shown a lesser propensity to cause antidopaminergic movement disorders and secondary negative symptoms by its strong antagonistic action on serotonergic 5HT-2A/2C and relative weaker action on muscarinic receptors.

Within a few years, however, evidence regarding its long-term metabolic side effects (hyperlipidemia, insulin resistance, weight gain) began accumulating [2,3]. Despite these metabolic adverse effects, olanzapine is believed to have a benign effect on cardiovascular electrophysiological parameters [4,5]. This observation is based on studies that have focused on the propensity for antipsychotics to cause QTc prolongation and the subsequent risk of ventricular events like torsade de pointes, ventricular arrhythmias and sudden cardiac death [6]. Supraventricular events like atrial fibrillation, SVT have not been associated with atypical antipsychotics. To the best of our knowledge, this is the first report of an atypical antipsychotic (olanzapine) inducing a supraventricular adverse-effect in the therapeutic dose.

CASE REPORT

Mrs.N.L, a 47-year-old female was admitted for an acute psychotic episode lasting 5 days following a stressor at her workplace. She experienced 2nd person auditory hallucinations, persecutory and referential delusions with disruption in socio-occupational performance and personal care with poor insight into her condition. She did not have any past history of substance abuse or psychiatric illness. Investigations including a complete blood count, renal and hepatic parameters, electrolytes, thyroid functions, ECG and CT scan of the brain revealed no abnormalities.

The patient was initially stabilized with parenteral benzodiazepines which were tapered off after 2 days following control of agitation. Olanzapine was started at a dose of 10 mg in 2 divided doses and was maintained. The patient responded well with a reduction of psychotic symptoms within 4 days. On the 9th day of admission, the patient reported mild breathing difficulty, palpitations, and sweating. The blood pressure was 70/50 mm of Hg, pulse 120 beats per minute and respiratory rate 22 breaths per minute. She was stabilized with normal saline infusion with

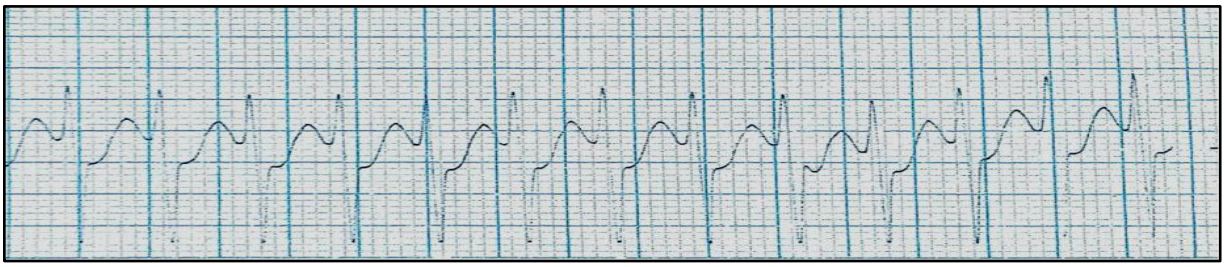
monitoring of vitals, while a medical consultation was sought. After 3 hours, the blood pressure returned to 100/78 mm of Hg, pulse rate to 72 beats per minute and respiratory rate to 18 breaths per minute.

ECG did not reveal any abnormalities at that time except for sinus tachycardia. The next morning, similar symptoms returned with a pulse rate of 214 beats per minute, BP of 90/64 mm of Hg and respiratory rate of 24 breaths per minute. This time the ECG revealed evidence of supraventricular tachycardia (SVT). (**see Figure1)**

Olanzapine was withheld and the patient was shifted to the coronary care unit as advised by the cardiologist. 2-D Echocardiography was performed to rule out any structural abnormality. The patient's pulse rose to 189 beats per minute and blood pressure went down to 80/64 mm of Hg. Myocardial infarction was ruled out by serial cardiac enzyme results. Diltiazem (calcium channel blocker) 10 mg intravenous infusion was attempted but the pulse rate and BP continued to deteriorate.

Finally, the patient's SVT was controlled by amiodarone infusion (600 mg). After 2 hours the patient's vitals returned back to normal. She was shifted back to psychiatric services 24 hours later. Serial ECGs performed before discharge showed normal sinus rhythm. The patient was discharged with amiodarone (400 mg in 2 divided doses) which was tapered and stopped after 3 months without any relapse of SVT. The patient has been on follow up for the last 6 months without any cardiac incidents.

Figure 1: ECG showing a heart rate of 214 beats/min with a narrow QRS complex, absent P wave, and ST segment depression suggestive of SVT



DISCUSSION

The risk of ventricular cardiac conduction abnormalities has been a known adverse effect of antipsychotics. This is linked to prolongation of the QT interval mediated by the anticholinergic and antiadrenergic receptor affinities along with a direct potassium channel blocking capacity of antipsychotic medications [7]. However, atrial (supraventricular) events have not been reported in literature, especially with therapeutic doses of antipsychotics. The differential diagnosis of SVT seen in this patient includes infarction, atrioventricular nodal disease, thyrotoxicosis, and drugs all of which were ruled out by investigations.

Our patient had no prior evidence of cardiac disease and had not experienced similar episodes of shortness of breath and dyspnea before, with a normal ECG on admission. In addition, the patient had no prior exposure to psychotropic medication and was presently not on any other medications. Olanzapine displays linear kinetics over the clinical dosing range with a half-life ranging from 21-54 hours [8]. Therefore, a direct cardiotoxic effect from olanzapine accumulation was ruled out.

SVT could occur secondary to central nervous system-mediated sympathetic influences. Often, the tachycardia presents in patients with no evidence of organic heart disease. Brain serotonergic neurons are involved in cardiovascular regulation, inhibiting sympathetic traffic to the heart and arterial system [9,10]. These neural changes manifest to decrease the *ventricular* arrhythmogenic threshold. Therefore, olanzapine with its strong serotonergic (5HT2A/2C) inhibitory effects could theoretically promote an arrhythmogenic focus. Several follow-up consultations in the subsequent 6 months revealed no evidence of further episodes of SVT. Therefore, SVT secondary to the recommended therapeutic dose of olanzapine must be proposed as the mechanism of this clinical presentation.

CONCLUSION

Despite the low incidence of cardiac conduction disturbances with olanzapine, a subset of individuals may be predisposed to the development of SVT presenting as palpitations and/or dyspnoea which might mimic anxiety states and panic attacks. Characterization of this subset of individuals is not available due to the lack of data in similar cases. Therefore clinicians should be wary of this rare but potentially serious adverse effect of olanzapine.

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