# Methadone-induced Torsades de pointes

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## ABSTRACT

Torsades de pointes is a polymorphic ventricular tachycardia that can quickly evolve into ventricular fibrillation and sudden death. This arrhythmia often occurs secondary to medication- induced cardiac repolarization dysfunction with resultant prolonged QTc interval on ECG. Numerous medications can predispose patients to this deadly tachycardia. We report a case of methadone-induced Torsades de pointes complicated by ventricular fibrillation and cardiac arrest. Through rapid taper of methadone, the patient's ECG normalized, allowing for safe discharge. This clinical vignette highlights the importance of close monitoring of patient medications. Performing periodic ECGs with prompt removal of offending agent when repolarization abnormalities are appreciated is ideal. Most importantly, as the vast array of medications continues to grow, it is imperative that clinicians are cognizant of side effects and tailor treatment accordingly.


**KEYWORDS:** Torsades de pointes, methadone, prolonged QTc, polymorphic ventricular tachycardia, ECG

## INTRODUCTION

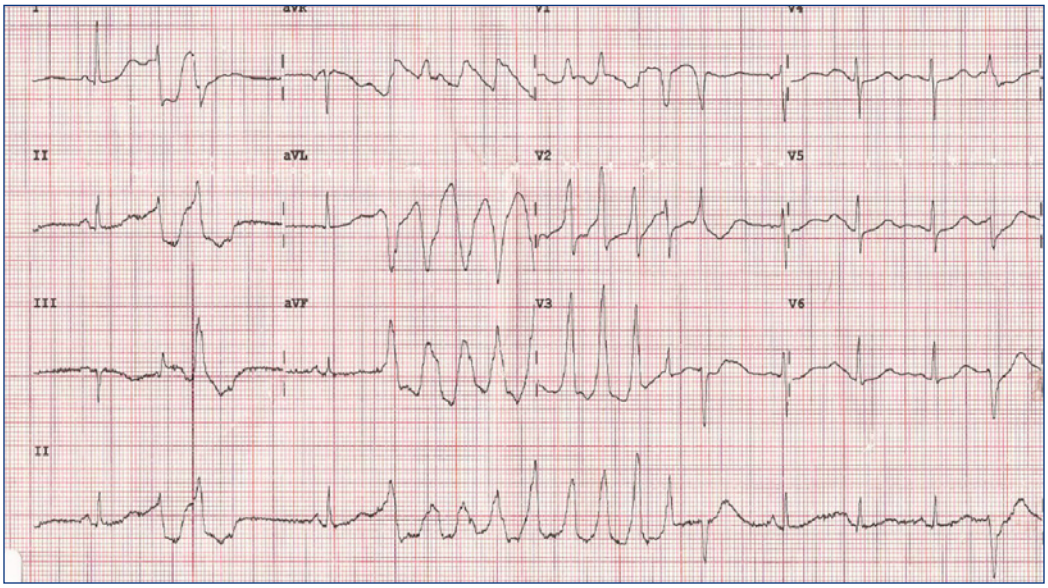
Polymorphic ventricular tachycardia is a wide-complex tachycardia that can rapidly degenerate into ventricular fibrillation and sudden death. A subtype of polymorphic ventricular tachycardia, Torsades de pointes, results from cardiac repolarization abnormalities and is manifest on surface ECG as a prolonged corrected QT interval (QTc). It is often medication induced. A case of prolonged QTc resulting in this potentially lethal arrhythmia was observed and believed to be secondary to a very high methadone dose.

## CASE PRESENTATION

A 45-year-old woman with a history of intravenous drug abuse on chronic methadone therapy presented with possible non-epileptic seizures. Her home medications included: quetiapine, 200mg daily; methadone, 280mg daily; fluoxetine, 40mg daily, and aprazolam, 1mg three times a day. Initial evaluation in the emergency room, including routine blood work, was unremarkable. ECG incidentally noted a nine-beat run of polymorphic wide-complex tachycardia consistent with non-sustained ventricular tachycardia (**Figure 1**). The QTc interval was 540 milliseconds. The patient was admitted to the cardiology service for ECG monitoring.

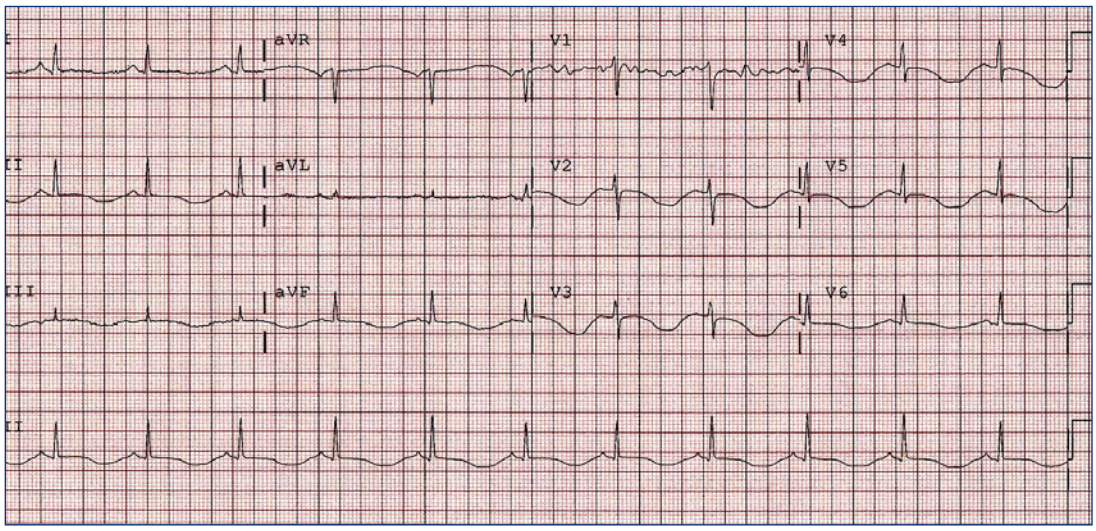
Shortly thereafter, the patient experienced frequent runs of non-sustained ventricular tachycardia culminating in an episode of Torsades de pointes and ventricular fibrillation. Cardiopulmonary resuscitation, amiodarone administration and defibrillation resulted in successful return of spontaneous circulation. Repeat ECG demonstrated a prolonged QTc interval of 720 milliseconds (**Figure 2**). Her methadone dose was reduced, followed by a quick taper and transition to buprenorphine. She was counseled on avoidance of methadone in the future. At the time of discharge, the QTc interval was less than 500 milliseconds.

**Figure 1.** ECG obtained in the emergency room illustrating a nine beat run of non-sustained ventricular tachycardia.



## DISCUSSION

Figure 2. ECG after cardiac arrest illustrating a corrected QT interval of approximately 720 milliseconds.




Torsades de pointes is a polymorphic ventricular tachycardia that can lead to sudden death. Predisposing conditions include electrolyte abnormalities and an acquired long QT interval, most commonly due to medication effects on normal cardiac electrophysiology. On a cellular level, prolongation of the QT interval represents myocyte repolarization dysfunction secondary to decreased efflux of potassium cations through blockade of rapid potassium current.[1,2] This blockade causes subsequent delay in action potential repolarization. Early after depolarizations (EADs) are then trigged which can lead to premature ventricular beats followed by compensatory pauses.[2,3] Additional EADs and compensatory pauses may then occur due to the potassium channel blockade, resulting in a characteristic long-short RR intervals and the substrate for polymorphic ventricular tachycardia.[2] Although usually self-terminating, it can degenerate into ventricular fibrillation.

Many common medications increase the QT interval and place patients at risk for these lethal arrhythmias. Notorious drugs include certain anti-psychotics, analgesics, and antibiotics. In the above clinical scenario, the patient's unusually high methadone dose of 280mg led to a prolonged QT interval and resultant Torsades de pointes. The patient's additional psychiatric medications, quetiapine and fluoxetine, likely potentiated this effect.

Due to the unpredictable nature of QT prolongation and Torsades de pointes, a common dilemma facing clinicians is how these medications should be monitored to prevent potentially fatal arrhythmias. Periodic ECG monitoring of the QT interval and discontinuation of offending medications in the setting of prolonged intervals is ideal. If this is not feasible, practitioners should remain cognizant of potential additive medications on QT prolongation. In the case of patients with severe opioid dependency requiring very high doses of methadone, alternative agents such as buprenorphine, a mixed opioid antagonist/agonist, should be considered. This medication is proven to reduce opiate relapse and usually does not significantly increase the QT interval.[4] As the vast array of medications continues to expand, a multidisciplinary approach involving both clinicians and pharmacists may be the best way to avoid this serious, pharmaceutical complication.

### References

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