Brugada-Type Electrocardiographic Changes Induced by Long-Term Lithium Use

Douglas Wright, MD; Omid Salehian, MSc, MD, FRCPC

A 49-year-old man presented to the emergency department with a 3-month history of increasing ataxia, tremors, and slurred speech. He had a history of bipolar disorder that required lithium, carbamazepine, and risperdone therapy for mood modulation. A serum lithium level measurement was performed and was found to be 2.5 mmol/L (therapeutic range 0.8 to 1.2 mmol/L). There was no history of suicidal ideation, recent medication changes, improper medication administration, recent volume depletion, or renal insufficiency. There was no family history consistent with sudden cardiac death.

A 12-lead ECG showed normal sinus rhythm at a rate of 64 bpm, with a normal axis, a prolonged corrected QT interval of 479 ms, and a pseudo right bundle-branch block pattern consistent with a type 1 Brugada pattern (Figure 1). The patient was managed conservatively with discontinuation of the lithium, intravenous hydration, and serial lithium level measurements and ECGs. The ECGs showed gradual resolution of the Brugada pattern with decreasing serum lithium levels (Figures 2 and 3). Lithium was discontinued, and outpatient psychiatric and arrhythmia consultations were arranged.

Lithium is a widely used medication and is the primary treatment for bipolar disorder. It is well described that lithium causes a wide range of cardiac side effects, ranging from nonspecific T-wave changes to ventricular fibrillation. Brugada-pattern ECG changes are not widely seen. In 2005, using Chinese hamster ovarian cells, Durbar et al showed that lithium blocks sodium channels in a dose-dependent manner.

The interaction between lithium and Brugada syndrome has been described in only a few case reports. The clinical result ranges from isolated ECG changes to cardiac syncope and sudden cardiac death. Removal of lithium resulted in normalization of the ECG or conversion to type 2 or 3 Brugada ECG changes. Even at therapeutic levels, Brugada-pattern ECG changes have been reported.

Figure 1. Twelve-lead ECG showing Brugada type 1 pattern with corresponding lithium level of 2.7 mmol/L.
Disclosures

None.

References


Figure 2. Twelve-lead ECG showing Brugada type 1 pattern with corresponding lithium level of 1.9 mmol/L.

Figure 3. Twelve-lead ECG in normal sinus rhythm with complete resolution of the Brugada pattern with corresponding lithium level of 0.8 mmol/L.
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