

Introduction & Background

- Digoxin is used clinically in heart failure and in certain supraventricular tachyarrhythmias. It has a narrow therapeutic index and requires close monitoring of its level to prevent toxicity.
- As per the United States poison control in 2017, 1689 cases of digitalis toxicity were reported. Of those, 559 suffered moderate or major toxicity and 23 resulted in death.
- Serum digoxin concentration does not necessarily correlate with toxicity and diagnosis of digoxin toxicity is made clinically based upon a combination of history, suggestive clinical features and associated electrocardiographic (ECG) manifestations.
- We present a case where a patient developed digoxin toxicity despite normal levels of serum digoxin and potassium.

Case Presentation

- Our patient is a 56-year-old Caucasian male with history of atrial flutter/fibrillation, heart failure with preserved ejection fraction, coronary artery disease status post coronary artery bypass graft surgery, mechanical aortic valve replacement presented to the emergency department with progressive generalized weakness, fatigue, and shortness of breath for 5 days.
- He was on metoprolol and verapamil for rate control of atrial flutter/fibrillation. However, due to his borderline normal blood pressure and inadequate rate control, he was started on digoxin two months ago.
- On admission, patient was noted to be hypotensive and bradycardic (blood pressure of 87/54 mmHg, heart rate of 50 beats/min). Initial labs remarkable for elevated creatinine of 4.86 mg/dL (baseline creatinine-0.6 mg/dL) consistent with acute kidney injury. He had normal serum potassium and magnesium levels. Troponin was negative.

Hospital Course

- His electrocardiogram (ECG) showed new junctional rhythm with depressed and concave ST segment typical of “digoxin effect” (Figure 1).
- Transthoracic echocardiogram showed normal ejection fraction without any wall motion abnormalities. Serum digoxin level was obtained and found to be normal at 1.0 ng/mL.
- Digoxin toxicity was suspected due to persistent bradycardia despite fluid boluses and norepinephrine, along with ECG abnormalities.
- Patient was administered antidotal therapy with DigiFab. Few hours after administration of DigiFab, his heart rate improved and he was in atrial fibrillation with rapid ventricular response (Figure 2) requiring amiodarone infusion. He was later discharged on amiodarone and metoprolol.

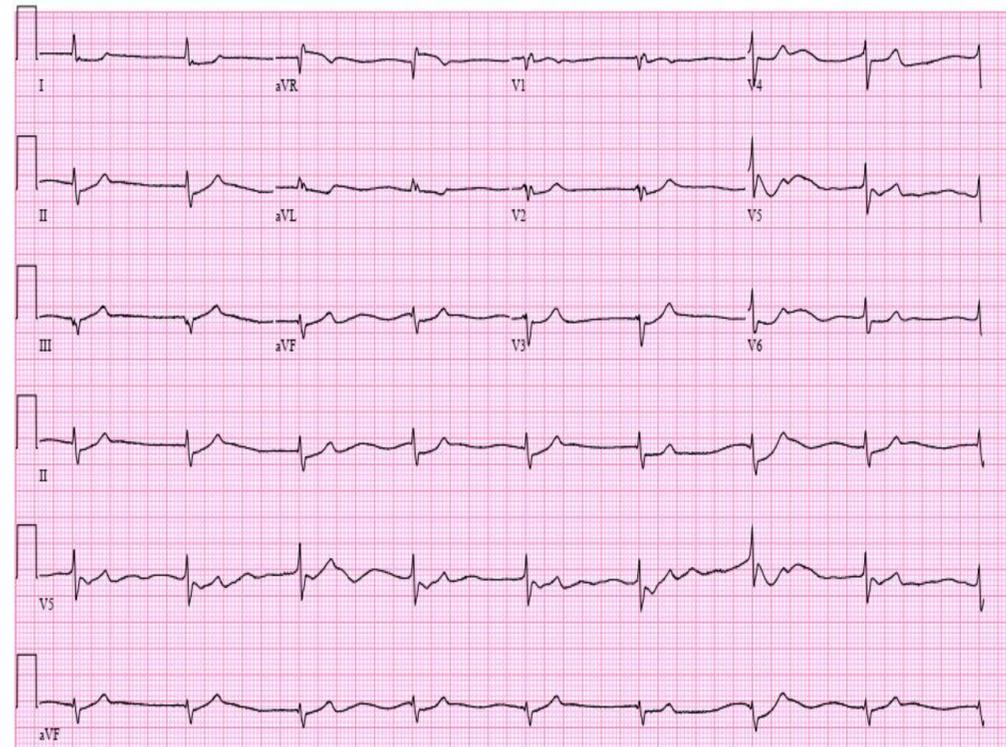


Figure 1: ECG on admission typical of “digoxin effect”

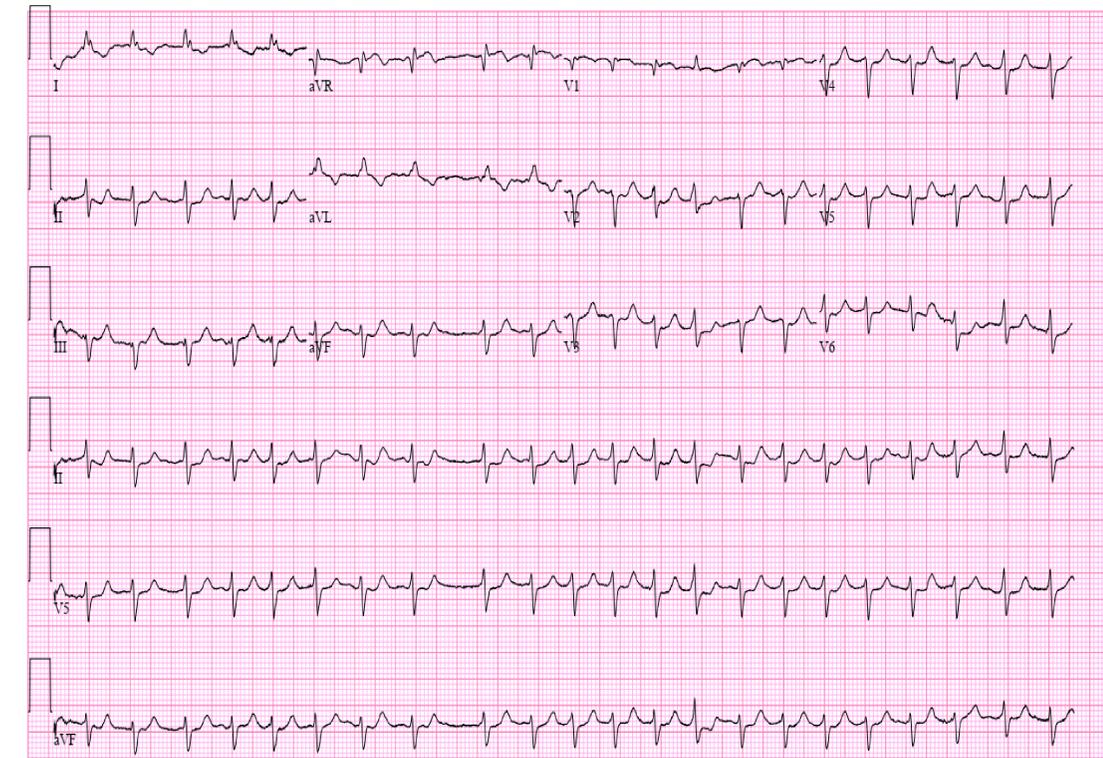


Figure 2: ECG post DigiFab showing atrial fibrillation with rapid ventricular response

Discussion

- Digoxin toxicity can occur with precipitating factors such as renal dysfunction, hypokalemia, or hypomagnesemia or drug interactions (medication such as verapamil can increase serum digoxin concentrations).
- Our patient has digoxin toxicity, despite normal digoxin levels, which likely happened in the setting of his renal dysfunction and verapamil use.
- This case emphasizes that digoxin toxicity can occur in patients with normal digoxin and potassium levels and the diagnosis of digoxin toxicity should be based upon clinical and electrocardiographic manifestations, not serum digoxin level.