



# Lithium Toxicity Associated with Transient Signs of Ischemia: A Case Report



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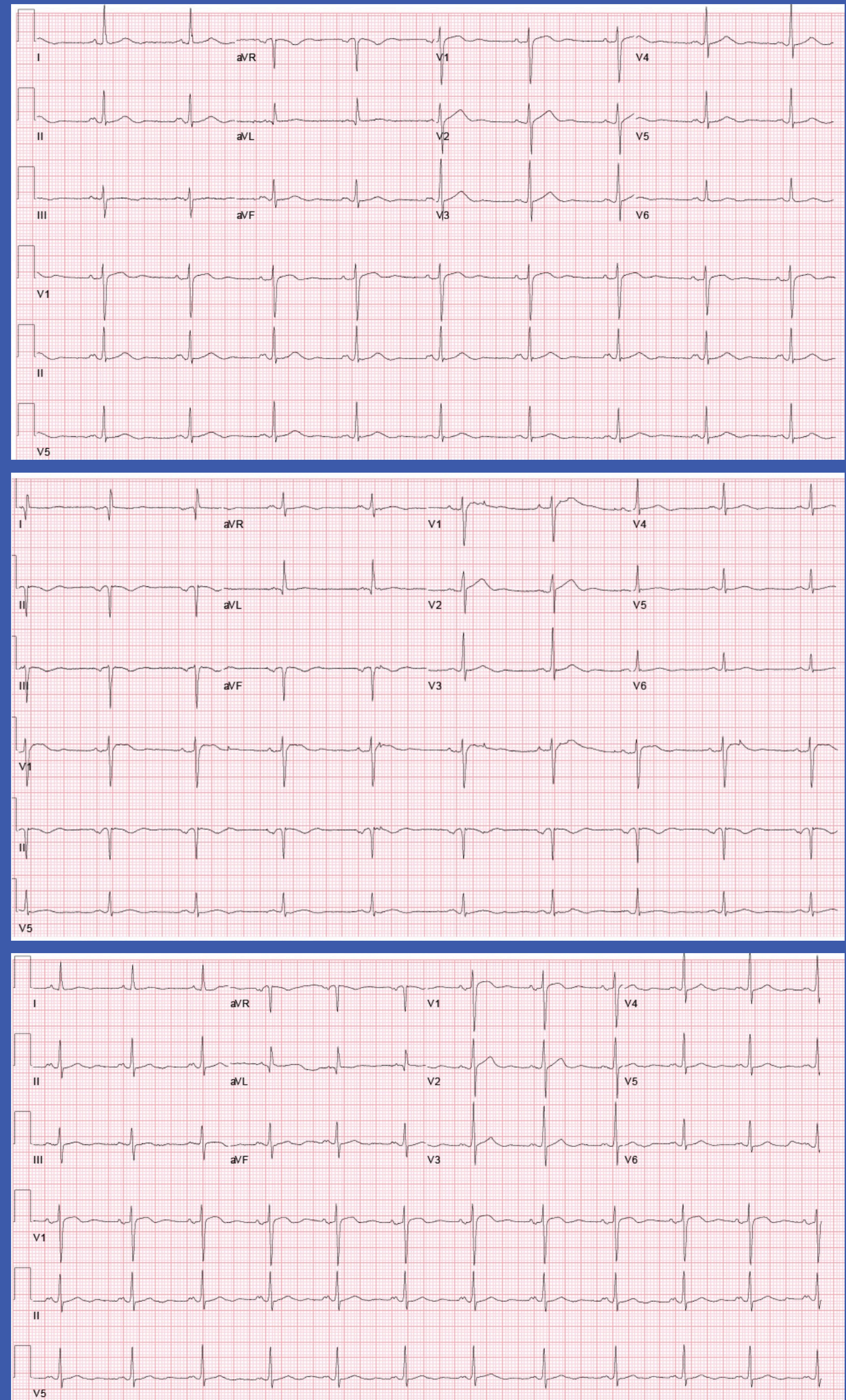
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## Learning Objectives

- Recognize EKG abnormalities associated with Lithium overdose
- Recognize various causes of Lithium toxicity

## Case Description

- Case: 63M with paranoid schizophrenia presenting with altered mental status and agitation for 3 days. Per nursing home staff, he had low appetite with hypoglycemia.
- In ED, blood pressure elevated to 158/80 (other vitals normal). He was oriented only to name and was restless with flat affect. Creatinine 1.74
- On admission: EKG: Normal sinus rhythm. Lithium level = 1.63
- Next morning: EKG: new sinus bradycardia (HR=56) and isolated TWI in lead III. Lithium level = 1.61 (Figure 1)
- EKG few hours later: persistent bradycardia with new left-axis deviation and TWI in leads II, III, and aVF. Troponins negative and patient without chest pain, dizziness, SOB. (Figure 2)
- Following day, EKG with resolved bradycardia and without TWI. Lithium down to 1.27 (Figure 3). Improving mentation.
- 3 days after admission, patient continued to be treated with IV fluids. Lithium was down to therapeutic level (1.12), and patient was able to respond to questions appropriately.



Figures 1-3. EKGs with bradycardia and T-wave inversion (TWI) as outlined in case presentation.

## Discussion

- Lithium is commonly used as mood stabilizer with narrow therapeutic index (normal 0.6-1.2 mEq/L). Lithium's mechanism is unknown.
- His Lithium toxicity was caused by dehydration and acute kidney injury in setting of poor intake.
- Other causes of Lithium toxicity:
  - Volume disturbance such as diuretics, GI loss or CHF
  - Decreased renal clearance such as CKD
  - Drug interactions such as ACEI, NSAID
  - Older age
- Treatment generally consists of IV fluids
- Hemodialysis is recommended if:
  - Serum levels >4.0 mEq/L
  - Hemodynamically unstable
  - Severe neurological symptoms
- Toxic effects can be seen at 1.5 mEq/L; severity of side effects is not dose-related.
- Common non-cardiac side effects include:
  - GI: nausea, vomiting, diarrhea
  - Endocrine: hypothyroidism, diabetes insipidus
  - Renal: acute renal failure
  - Neurologic: confusion, tremors, ataxia, seizures
- Cardiac side effects:
  - T-wave depression (15-30%)
  - Sinus bradycardia
  - First and second-degree sinoatrial blocks
  - Prolonged QTc interval
  - ST depressions and elevations
  - Ventricular arrhythmias

## Implications

- In our case, toxic Lithium levels were associated with sinus bradycardia, left-axis deviation, and T-wave inversions in leads II, III, aVF. These resolved as Lithium levels improved to therapeutic levels.
- We recommend careful cardiac monitoring and close monitoring of elderly patients or patients with renal disease, even if on stable Lithium doses.