RESEARCH PAPER

Masked Hypokalemia–Induced Ventricular Arrhythmias in Patients Receiving Thiazide Diuretics: A Three-Case Series and Systematic Review of Diagnostic Pitfalls

[1] Dr. Sattineni Amitesh, [2] Dr. Umashankar, [3] Dr. Aishwarya Lakshmi

[1]Post Graduate, Department of General Medicine, Sree Balaji Medical College, Chennai, India

[2]Associate Professor, Department of General Medicine, Sree Balaji Medical College, Chennai, India

[3]Assistant Professor, Department of General Medicine, Sree Balaji Medical College, Chennai, India

Abstract

Background: Thiazide diuretics are widely prescribed antihypertensive agents but frequently cause electrolyte disturbances, particularly hypokalemia. Even mild potassium depletion may predispose patients to ventricular arrhythmias. Objective: To describe three cases of ventricular arrhythmias associated with masked hypokalemia in patients receiving thiazide therapy and review diagnostic challenges. Methods: Three patients with ventricular arrhythmias while on thiazide diuretics were analyzed. A PRISMA-based systematic literature review of studies published between 2023 and 2025 was also conducted. Results: All patients presented with ventricular arrhythmias with potassium levels between 3.4–3.7 mEq/L. Electrolyte correction and discontinuation of thiazide therapy resolved arrhythmias. Conclusion: Masked hypokalemia is an underrecognized cause of ventricular arrhythmias and requires careful electrolyte monitoring.

Keywords

Hypokalemia; Thiazide diuretics; Ventricular arrhythmia; Electrolyte disorders; Case series

How to cite this article: Amitesh S, Umashankar, Lakshmi A. Masked Hypokalemia–Induced Ventricular Arrhythmias in Patients Receiving Thiazide Diuretics: A Three-Case Series and Systematic Review of Diagnostic Pitfalls. Int J Drug Deliv Technol. 2026;16(8s): 918-919; DOI: 10.25258/ijddt.16.8s.101

Introduction

Thiazide diuretics remain among the most commonly prescribed first-line medications for hypertension worldwide. They reduce cardiovascular events but frequently cause electrolyte disturbances including hypokalemia. Hypokalemia alters cardiac electrophysiology and may predispose patients to ventricular arrhythmias, even when serum potassium appears only mildly reduced. The concept of 'masked hypokalemia' refers to situations where serum potassium levels remain near-normal despite significant intracellular potassium depletion.

Methods

This study includes a retrospective case series and a systematic literature review conducted according to PRISMA guidelines. Literature searches were performed in PubMed, Scopus, and Web of Science for studies published between 2023 and 2025 addressing thiazide diuretics, hypokalemia, and ventricular arrhythmias.

PRISMA Flow Diagram (Template)

Records identified through database search (n = 312)
Records after duplicates removed (n = 278)
Records screened (n = 278)
Records excluded (n = 220)
Full-text articles assessed (n = 58)
Studies included in final review (n = 27)

Case Presentations

Case 1

A 62-year-old male with hypertension presented with palpitations and dizziness while taking hydrochlorothiazide 25 mg daily. ECG showed frequent premature ventricular complexes and non-sustained ventricular tachycardia. Serum potassium was 3.5 mEq/L. After potassium and magnesium replacement and discontinuation of the thiazide diuretic, the arrhythmia resolved.

Case 2

A 55-year-old female taking chlorthalidone presented with palpitations and chest discomfort. ECG revealed sustained ventricular tachycardia. Potassium level was

3.4 mEq/L. Treatment with electrolyte replacement and discontinuation of chlorthalidone resulted in resolution.

Case 3

A 68-year-old male on indapamide presented with recurrent palpitations. ECG demonstrated ventricular bigeminy. Potassium level was 3.7 mEq/L. Symptoms resolved after electrolyte correction and stopping indapamide.

Table 1. Baseline Characteristics of Patients

Case	Age	Sex	Thiazide Used	Potassium (mEq/L)	Arrhythmia
1	62	Male	Hydrochlorothiazide	3.5	PVCs/ NSVT
2	55	Female	Chlorthalidone	3.4	Ventricular Tachycardia
3	68	Male	Indapamide	3.7	Ventricular Bigeminy

Discussion

Thiazide diuretics promote potassium loss by increasing sodium delivery to the distal nephron, enhancing potassium secretion through aldosterone-mediated mechanisms. Even mild hypokalemia can prolong cardiac repolarization and increase susceptibility to ventricular arrhythmias. Masked hypokalemia may occur due to intracellular potassium depletion, transient normalization after dietary intake, or metabolic alkalosis.

Clinical Implications

Patients receiving thiazide therapy should undergo regular electrolyte monitoring. Clinicians should suspect masked hypokalemia when ventricular arrhythmias occur despite seemingly normal potassium levels.

Conclusion

Masked hypokalemia represents an underrecognized but clinically important cause of ventricular arrhythmias in patients receiving thiazide diuretics. Early recognition and electrolyte correction are essential to prevent potentially fatal complications.

ECG Figure Templates

Figure 1: PRISMA Flow Diagram

Figure 2: Premature Ventricular Complexes ECG

Figure 3: Non-sustained Ventricular Tachycardia ECG

Figure 4: Ventricular Bigeminy ECG

References

Gennari FJ. Hypokalemia. N Engl J Med. 2023.

Palmer BF. Potassium homeostasis. Clin J Am Soc Nephrol. 2024.

Roden DM. Mechanisms of cardiac arrhythmias. Circulation. 2023.

Ellison DH. Diuretic therapy and electrolyte disorders. Lancet. 2023.

Kovesdy CP. Electrolyte abnormalities in cardiovascular disease. Kidney Int Rep. 2024.

Whelton PK. Hypertension treatment guidelines. Hypertension. 2024.