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Signs of hypocalcemia in chronic kidney disease due to secondary hyperparathyroidism; the electrocardiogram pattern

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A 57-year-old-woman was referred to our emergency department with myalgia, muscle spasms, cramps and acral paresthesia. Our patient was a known case of stage IV (eGFR: 28 mL/min) chronic kidney disease (CKD) with hypertension, diabetes mellitus type II and coronary artery disease (CAD) (Table 1). On physical examination, tachycardia, trousseau's sign and Chvostek's sign were noted. The change on the electrocardiogram (ECG) includes normal axis with sinus tachycardia, ST-segment depression and T-wave inversion in II, III and AVF leads, and also ST-segment depression in V_3 to V_6 with prolongation of the QT interval (470 milliseconds) (Figure 1).

According to indication of intravenous (IV) calcium therapy such as serum corrected calcium ≤7.5 mg/dl, presence of trousseau's sign and Chvostek's sign and prolonged QT interval, the patient was treated with IV calcium (1 gram of calcium gluconate, in 50 mL of 5 percent dextrose was infused over 10 minutes, then a solution containing 11 g of calcium gluconate in 1000 mg 5% dextrose water administered at an initial infusion rate of 50 mL/hour), calcitriol (0.25 mcg twice daily) and oral calcium carbonate (3 g in 3 divided doses daily) (1,2). Finally, the patient was discharged with medical therapy after improving signs and symptoms with correcting the ECG abnormalities.

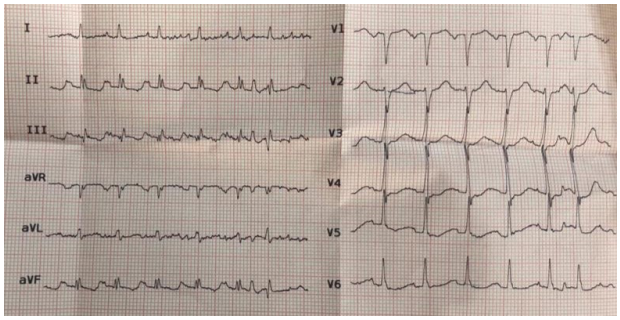

Figure 1. The electrocardiogram (ECG) changes: normal axis with sinus tachycardia, ST-segment depression and T-wave inversion in II, III and AVF leads, and also ST-segment depression in V3 to V6 with prolongation of the QT interval (470 milliseconds).

Implication for health policy/practice/research/medical education

Severe and/or acute hypocalcaemia may be associated with severe life-threatening symptoms, which intravenous calcium therapy is preferred.

Conclusion

It is suggested intravenous calcium therapy in asymptomatic patients with corrected calcium ≤7.5 mg/dL, symptomatic patients (seizure, trousseau's sign, Chvostek's sign) and patients with prolonged QT interval.

Table 1. The patient's laboratory data at the time of admission

	Patient	Normal range
Serum creatinine (Cr)	2.6 mg/dL	0.7-1.4 mg/dL
Serum natrium (Na)	137 mEq/L	135-145 mEq/dL
Serum potassium (K)	4.2 mEq/L	3.5-5.5 mEq/L
Serum calcium (Ca)	7.1 mg/dL	8.6-10.3 mg/dL
Serum phosphate (P)	6.3 mg/dL	2.7-4.5 mg/dL
Serum magnesium (Mg)	2.4 mEq/L	1.9-2.5 mEq/L
Serum albumin (Alb)	4.2 g/dL	3.5-5.5 g/dL
Serum parathyroid hormone (PTH)	85 pg/mL	15-65 pg/mL
Serum acidity (PH)	7.36	7.35-7.40
Serum carbon dioxide (PCO_2)	39 mm Hg	40 mm Hg
Serum bicarbonate (HCO_3)	22 mEq/L	24 mEq/L
White blood cell (WBC)	$7.6 \times 10^3/\mu L$	$4.5\text{-}11 \times 10^3/\mu L$
Red blood cell (RBC) count	4.8×10^6	$4.7\text{-}6.1 \times 10^6$
Hemoglobin (Hb)	8.5 g/dL	12-15 g/dL
Mean corpuscular volume (MCV)	86.8 fl	80-95 fl
Platelet (Plt)	246×10^3	$150\text{-}1400\ 10^3$

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Authors' contribution

All authors passed four criteria for authorship contribution based on recommendations of the International Committee of Medical Journal Editors. MR and FS conducted the research. MR, FS and BK wrote the primary draft. MB prepared the final paper. All authors read and signed the final paper.

Conflicts of interest

The authors report no conflicts of interest.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors. The patient has given her informed consent regarding publication of this case report.

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