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CASE REPORT

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Cotrimoxazole-induced hyperkalemia in renal transplant patient—Case report

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Abstract

We present the case of a 55-year-old male patient who developed hyperkalemia after using Cotrimoxazole (TMP-SMX). There was a marked increase in potassium levels from 3.3 mEq/L on Day 5 when cotrimoxazole was started to 6.2 mEq/L on Day 11 when the drug was withheld.

KEYWORDS

case report, cotrimoxazole, hyperkalemia, TMP-SMX

1 | INTRODUCTION

Hyperkalemia is defined as an increase in serum potassium levels above 5.5 mEq/L. Patients with mild hyperkalemia are asymptomatic whereas moderate to severe hyperkalemia can present as muscle weakness, periodic paralysis, and life-threatening cardiac arrhythmias. Usually, the symptoms of hyperkalemia develop when the serum potassium levels are higher than 6–7 mEq/L. Hyperkalemia can occur due increased intake, altered intracellular shifts (hyperglycemia, metabolic acidosis), increased tissue catabolism (trauma, burns, tumor lysis syndrome), and impaired excretion in acute or chronic renal failure. Drug-induced hyperkalemia is also occasionally encountered in clinical practice. In a study by Elena Ramírez et al., the incidence of life-threatening drug-induced hyperkalemia was reported as 3 per 10,000 admissions.[1] Common causes of drug-induced hyperkalemia are Angiotensin-converting enzyme inhibitors, Angiotensin receptor blockers, potassium-sparing diuretics, cardiac glycosides, nonselective beta-blockers, cyclosporine, etc. Trimethoprim-sulfamethoxazole (Cotrimoxazole) is one such drug causing hyperkalemia, which is used as a prophylaxis of choice for Pneumocystis jiroveci in patients with solid organ transplant.

We present a case of TMP-SMX-induced hyperkalemia in a renal transplant patient. This case report has been reported in line with the CARE 2013 guidelines.[2] This case will raise awareness among clinicians to keep an eye on serum potassium levels while prescribing cotrimoxazole as it can induce fatal hyperkalemia.

2 | CASE PRESENTATION

A 55-year-old male patient, weighing 50 kg was posted for a kidney transplant. He is a businessman by profession and a resident of Assam. He is a known case of Chronic

Kidney disease (CKD) Stage 5 for which he was on hemodialysis (HD) since Jan'21. The reported known comorbidities were hypertension (HTN), diabetes mellitus (DM), Ischemic heart disease, and Pulmonary Tuberculosis for which he was taking regular medications.

The preoperative workup was normal (Table 1). A history of blood transfusion and erythropoietin supplementation was noted.

On January 26, 2022, he received a living-related kidney transplant from a haploidentical sister, 57 year old, weighing 65 kg. It was an ABO-compatible transplant. The donated kidney was the right kidney, with a single donor artery. The arterial anastomosis was through External Iliac Artery (EIA) from end to side and Venous anastomosis through the external iliac vein (EIV) from end to side. The Cold Ischemia Time (CIT) and warm ischemic time (WIT), were 7 and 30 min, respectively, with a remarkable state of diuresis. A double-J (DJ) stent and a one-tube drain were placed. The surgery lasted for 4 h and required 2 units of blood transfusion. The patient was given induction with 3 doses of 75 mg of anti-thymocyte globulin (ATG). During the surgery, an abscess was detected in the extraperitoneal layer of the lower abdomen which was drained and sent for culture and sensitivity analysis. The laboratory investigations are mentioned in Table 2.

The patient was on drugs Inj. CEFTAZIDIME 1 g BD from POD:0–5; Inj. TEICOPLANIN 200 mg BD from POD:1–11; Inj. PANTOPRAZOLE 40 mg BD POD: 0–4 which was changed to Tab. PANTOPRAZOLE 40 mg OD BBF POD:5–13, Inj. METHYLPREDNISOLONE 125 mg BD POD:1–11; Inj. ONDANSETRON and TRAMADOL were given as STAT drugs on POD:0, 1; Tab. MYCOPHENOLIC ACID 360 mg BD as immunosuppressants from POD:0–13; Tab. TACROLIMUS 1 mg BD as immunosuppressants from POD:2–13; Tab. AMLODIPINE POD:3–7 for his elevated Blood Pressure (BP) levels; Syrup GELUSIL 2 tsp TID POD:0–5 for his constipation; Tab. VALGANCICLOVIR 450 mg OD as prophylactic anti-viral from POD:5–13; Tab. FLUCONAZOLE 150 mg Alternate day as prophylactic anti-fungal from POD:5–13; Tab. AMOXICILLIN+POTASSIUM CLAVULANATE 625 mg BD as antibiotic from POD:10–13; Tab. PREDNISOLONE 10 mg BD as immunosuppressant from POD:11–13.

TABLE 1 Preoperative workup

Pre-operative Work up	Value	Interpretation
Hb	11.7 g/dl	Normal
TLC	10,600	Normal
Urea	19 mg/dl	Normal
Serum Creatinine	0.8 mg/dl	Normal
Serum Calcium	8.6 mg/dl	Normal
Serum Phosphorus	4.6 mg/dl	Normal
Uric acid	5.4 mg/dl	Normal
Serum Sodium	136 mEq/L	Normal
Serum Potassium	3.4 mEq/L	Normal
Serum Chloride	101 mEq/L	Normal
Bleeding Time	2 min	Normal
Clotting Time	5 min	Normal
2D Echo ejection fraction	60% Ejection fraction with good ventricular function	Normal

Tab COTRIMOXAZOLE (TMP-SMX) OD was given as prophylactic anti-bacterial from postoperative Day 5 to 11. There was a marked increase in potassium levels from 3.3 mEq/L on Day 5 when cotrimoxazole was started, to 6.2 mEq/L on Day 11 when the drug was withheld.

The patient was treated with intravenous fluids and potassium binders in the hospital from day 11–13 in addition to withholding TMP-SMX which decreases the serum potassium levels to 5.1 mEq/L on Day 13. In addition to routine discharge medications, he was discharged with potassium binders twice daily until the next follow-up. The follow-up serum potassium level was 4.2 mEq/L.

The patient was discharged on February 7, 2022, POD-13 and was advised to review after 1 week (on February 15, 2022) in the OPD with repeat Renal Function Tests. The discharge medications advised were Tab. WYSOLONE 10 mg BD; Tab. TACROLIMUS 2 mg BD; Tab. MYCOPHENOLIC ACID 360 mg BD; Tab. PANTOPRAZOLE 40 mg OD BBF; Tab. AMOXICILLIN+POTASSIUM CLAVULANATE 625 mg BD (3 days); K-BIND Sachets BD (until next follow-up).

3 | DISCUSSION

Our patient has undergone a renal transplant for stage 5 chronic kidney disease and was already on hemodialysis for the past 1 year. The preoperative and intraoperative course was fair with no significant concerns. The early postoperative course of the patient was satisfactory. Cotrimoxazole was given from postoperative Day 5 to 11 which induced hyperkalemia in the patient. Trimethoprim inhibits sodium transport in the apical membrane of the distal nephron, reducing the transepithelial voltage and causing decreased potassium secretion, similar to amiloride.[3] A study conducted by Rana M Al AdAwi et al. about the incidence of cotrimoxazole-induced hyperkalemia in tertiary care showed 28% regardless of interacting drugs and 33% without interacting drugs.[4] Though hyperkalemia by TMP-SMX is

TABLE 2 Laboratory investigations

POD	Hb (gm/dl)	TLC (cumm)	RBS (mg/dl)	Urea (mg/dl)	Cr (mg/dl)	Na (mEq/L)	K (mEq/L)
0	12.2	14,500	357	78	2.86	136	4.6
1	10.7	12,100	172	55.1	2.11	142	3.1
2	11.2	17,600	146	33.5	0.81	135	4.1
3	10.8	15,500	133	30	0.64	134	3.9
4	11.3	18,500	117	35.9	0.56	133	3.4
5	12.1	13,600	248	34.5	0.56	132	3.3
6	13.3	12,300	139	27.8	0.52	136	3.0
7	12.7	13,400	313	30.5	0.42	127	3.8
8	13.4	19,000	135	33.4	0.45	133	4.6
9	14.3	21,000	78	37.1	0.51	131	4.9
10	14.1	16,400	133	39.4	0.54	131	6.0
11	14.3	17,300	162	46.8	0.66	128	6.2
12	14.8	18,100	246	47.3	0.7	125	5.5
13	14.9	20,800	109	55.6	0.7	128	5.1
Followup					0.83	133	4.2
Liver Function Tests: *T.Bil: 0.4; D. Bil:0.2; In.Bil: 0.2; ALP:112; SGPT: 90; SGOT:46; T.Pr: 7.6; Alb:2.6: Glob:5.0; A/G Ratio:0.5*							
Lipid Profile: *T. Chol:177; TG: 117; HDL: 74.8; LDL: 78.8* *VLDL: 23.4*; *Total Ch/HDL Ratio: 2.4* Others: *Calcium: 8.0; Phosphorous: 2.9; Magnesium:1.7, 1.9* *TAC level: 8.76 mg/dl*							

Abbreviations: Alb-Albumin; ALP-Alkaline Phosphatase; A/GRatio-Albumin/Globulin Ratio; Cr-Creatinine; D.Bil-Direct Bilirubin; Glob-Globulin; Hb-Hemoglobin; HDL-High Density Lipoproteins; In. Bil-Indirect Bilirubin; K-Potassium; LDL-Low Density Lipoproteins; Na-Sodium; POD-Post-Operative Day; SGPT-Serum Glutamic pyruvate transaminase; SGOT: Serum Glutamic oxalate transaminase; TLC-Total Leukocyte Count; T.Bil- Total Bilirubin; T.Pr- Total proteins; T.Chol- Total Cholesterol; TG-Triglycerides; VLDL: Very Low-Density Lipoprotein.

common in patients with renal insufficiency, it can even occur in patients with normal renal function[5] and with a standard dose.[6] Similarly, More AS et al. presented a case of TMP-SMX induced hyperkalemia in renal transplant.[7] Serum potassium levels should be monitored regularly in patients receiving TMP-SMX in the long term, especially in at-risk patients because the serum levels may rise even higher than 6.5 mEq/L.[6]

The study by R Alagappan et al. showed a statistically significant increase in serum potassium levels in patients after 5 days of treatment with TMP-SMX.[8] In our patient, there was a marked increase in potassium levels from 3.3 mEq/L on Day 5 when cotrimoxazole was started, to 6.2 mEq/L on Day 11 when the drug was withheld. In addition to cotrimoxazole withdrawal, the patient was treated with potassium binders and IV fluids from Day 11 to 13 and was discharged with relevant medications until the next follow-up. The follow-up serum potassium levels were 42.mEq/L.

4 | CONCLUSION

Timely identification of the cause of hyperkalemia is needed especially in patients at risk and on drugs that are known to cause hyperkalemia. Withdrawal or reducing the dose of the offending medication and prompt management can reverse this condition.

AUTHOR CONTRIBUTIONS

Prakhyath Srikaram, Amna Siddiqui, and Dr. Nabeela Fatima involved in study concept, data collection, interpretation, and manuscript writing. Fahad Gul and Puja Deuja involved in study concept, interpretation, and manuscript writing.

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CONFLICT OF INTEREST

No conflict of interest is to be declared.

DATA AVAILABILITY STATEMENT

The data that support the findings of this article are available from the corresponding author upon reasonable request

ETHICAL APPROVAL

Ethical approval was not required as per country guidelines.

CONSENT

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request

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