Chapter 6

Quadriparesis Secondary to Hypokalemia in Tenofovir Induced Fanconi Syndrome: A Case Report

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Abstract

Tenofovir disoproxil fumarate (TDF) is an extensively used antiretroviral medicine in the treatment of HIV, however its long-term usage is associated with kidney damage, mainly Fanconi syndrome. Proximal tubular dysfunction is a feature of this syndrome that causes the kidneys to lose vital electrolytes like potassium. Fanconi syndrome frequently results in hypokalemia, and extreme potassium deficiency can cause neuromuscular dysfunction, including quadriparesis, a disorder characterized by weakness or paralysis in all four limbs. Here we describe a case of 50 years old male patient presented with sudden onset of decreased responsiveness with known case of recurrent hypokalemia and hypoglycemia and diagnosed as Tenofovir induced Fanconi syndrome with Quadriparesis secondary to Hypokalemia.

Key Words: Tenofovir, fanconi syndrome, quadriparesis.

1. Introduction

The Food and Drug Administration of the United States (FDA) has authorized the prescription medication Tenofovir DF to treat HIV infection in adults and children aged 2 and up to who weigh at least 22 pounds (10 kg). It is usually necessary to use tenofovir DF in conjunction with other HIV medications [1]. An antiviral drug called tenofovir is used to treat and prevent HIV and AIDS as well as chronic hepatitis. In the event of a needlestick injury or other pre-exposure procedures, it serves as a prophylactic measure. The acyclic adenine nucleotide analogue tenofovir inhibits the HBV DNA polymerase. It is converted into active tenofovir diphosphate after absorption. MRP-4 and MRP-2 transporters carry about 20–30% into renal proximal tubule cells and release it into the lumen. Post-marketing studies have brought attention to renal toxicity, including acute kidney damage, chronic kidney disease, Fanconi syndrome, hypophosphatemia, and decreased bone mineral density, even though its primary cause is gastrointestinal problems [2]. The cause of Fanconi syndrome is widespread proximal renal tubule failure, which impairs the absorption of amino acids, glucose, urate, bicarbonate, and phosphate and increases their excretion into the urine. Polyuria, dehydration, hypokalemia, hypophosphatemia, and normal anion gap metabolic acidosis are among the basic clinical signs of FS [3,4]. Serum potassium levels below 3.5 mmol/L are known as hypokalemia, and they can cause myalgia, hyporeflexia, and muscle weakness. All four limb muscular weakness is known as quadriparesis, and it is usually brought on by trauma, stroke, transverse myelitis, electrolyte imbalances, or congenital conditions [5].

2. Case Report

A male patient of 50 years old presented with chief complaints of sudden onset of decreased responsiveness from yesterday. He was a known case of recurrent hypokalemia and on syrup potchlor and has a history of recurrent hypoglycemia.

Patient was admitted in an unconscious state, Gasping. On examination his blood pressure was found to be 130/80 mmHg and GRBS was 453 mg/dl (the patient's glucose levels were increased because of administration of 2 pints 25% dextrose in nearby hospital). He was intubated for gasping and poor GCS (Glasgow coma scale).

Patient has a past history of admission due to paraparesis secondary to hypokalemia and was prescribed with syrup potchlor. He has a history of hypoglycemic episodes (5-6 times since 2 months). He has been HIV positive for 5 years and on TLD regimen. The patient has a social history of alcohol use. On examination the patient was supported with mechanical ventilation and blood pressure is 110/70 mmHg and pulse rate was 92 bpm and cardiac and respiratory sounds are normal.

Table 1 The table shows the patients CNS examinations which were decreased.

CNS		**Right**	**Left**
Pupils		3mm	3mm
Tone	UL (Upper Limbs)	Decreased	Decreased
	LL(Lower Limbs)	Decreased	Decreased
Power	UL	2/5	2/5
	LL	2/5	2/5
Deep Tendon Reflexes	Biceps	+1	+1
	Triceps	+1	+1
	Supinator	+1	+1
	Knee	+1	+1
	Ankle	0	0
Planters		Decreased	Decreased

On blood tests his haemoglobin was 7 g/dl, WBC was 9710 cells/cumm, MCV- 69.6, HCT- 21.1, platelet- 165000, Neutrophils- 89.1, lymphocytes- 4.4, monocytes- 6.4, along with severe hypokalemia- 1.9 mmol/L and elevated creatinine levels 2.81 mg/dl. The arterial blood gas showed metabolic acidosis with a pH of 7.392, pO2 of 302.5 mmHg, pCO2 of 17 mmHg, HCO3 of 10.1 mmol/L and anion gap of 8 mmol/L. His CD4 count is 669 cells. His upper G.I endoscopy report reveals grade 2 hiatus hernia, non-erosive pan gastritis. Ultrasound scan of abdomen reveals bilateral grade 1 renal parenchymal disease with right end simple cysts.

The patient's treatment was started while on mechanical ventilation with Inj. potassium chloride 40 milli equivalents in 200 ml NS slow IV over 4 hours, Inj. pantoprazole 40 mg/IV/OD, Inj. Ondansetron 4 mg/IV/BD, Inj.piptaz 2.25 mg/iv/TID, Inj. Clarithromycin 500 mg/IV/BD, tab. Clotrimazole DS/OD, nebulisation with duolin and budecort /BD and GRBS hourly monitoring and TLD regimen was on hold.

With regular monitoring of GRBS levels on day 8 it was found to be 76 mg/dl and 25% dextrose/IV/TID and IVF 5% dextrose @ 30 cc/ hr was prescribed to monitor the levels

Table 2 The table shows the serum electrolytes values of the patient during his admission period.

Serum electrolytes	Day 1	Day 7	Day 11	Day 15
Sodium (mEq/L)	153	124	136	133
Potassium (mEq/L)	1.9	1.71	4.3	4.0
Chloride (mEq/L)	112	113	108	107
Calcium (mg/dL)	8.1	0.67	4.1	5.5
Magnesium (mg/dL)	1.9	1.7	1.8	2.4
Phosphate (mg/dL)	2.7	2.0	1.6	2.5
Creatinine (mg/dL)	1.72	2.81	3.02	1.7

Inj. Calcium gluconate 10 milli equivalents in 100 ml NS/IV/over 20 mins was prescribed over 20 mins and syrup potassium chloride 15 ml in 1 glass of water was prescribed in addition with Inj. Kcl. Thereby hypophosphatemia and hypocalcemia were corrected. The patient had additional complaints of vomiting's on day 8 and symptomatic treatment was given.

With the continuation of the treatment the patients CNS reflexes were also improved and the muscle power tone ⅘ in all four limbs.

3. Discussion

Hypokalemia-induced quadriparesis is an uncommon but severe side effect in patients with Tenofovir-induced Fanconi disease. Fanconi syndrome, a renal condition affecting the proximal renal tubules, can be brought on by the antiretroviral medication tenofovir, which is used to treat HIV and hepatitis B [2]. The reabsorption of vital nutrients such as potassium, glucose, bicarbonate, and phosphate is hampered by this malfunction. Hypokalemia (low blood potassium levels) results from people losing potassium through urine. Potassium is essential for healthy muscular contraction and cell electrical conductivity. Significant potassium deficiency can cause muscle weakness, which can develop into quadriparesis, or weakness in all four limbs. Prompt treatment is crucial because severe hypokalemia can result in heart arrhythmias, breathing problems, and muscle paralysis [3].

For management of this situation, normal potassium levels must be restored with oral or intravenous potassium supplementation. To stop more kidney damage, Tenofovir may also need to be stopped or substituted with another antiretroviral drug. To direct treatment and avoid recurrence, it's also critical to continuously check electrolyte balance and renal function. Quadriparesis symptoms can be reversed and the patient's condition can improve with prompt management, preventing more serious complications. In this patient electrolyte imbalances were corrected by using intravenous potassium chloride followed by syrup potassium chloride and intravenous calcium gluconate thereby correction of hypokalemia, hypocalcemia was done which helped in the improvement of muscle tone and CNS reflexes thereby improvement in quadriparesis. Regular monitoring of renal function and serum electrolytes is essential to avoid reoccurrence.

The patient should discontinue tenofovir and use an alternative antiretroviral medication because long term use of this medicine can cause renal toxicity, liver problems, lactic acidosis etc. As the patient has recurrent hypoglycemia it is important to monitor the GRBS levels regularly.

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