

Hypokalemic Quadriparesis: An Unusual Manifestation of Leptospirosis

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ABSTRACT

We report a 46-year-old male who presented with fever and flaccid weakness of all four limbs due to Leptospirosis associated hypokalemia. Acute hypokalemic quadriparesis is an uncommon presentation of leptospirosis, not yet widely recognised. Renal potassium wasting occurs in Leptospirosis and subsequently, the development of hypokalemia leads to paralysis. The patient had kaliuresis due to leptospirosis which improved with antibiotics and potassium replacement.

CASE REPORT

A 46-year-old male, welder by occupation, presented with first episode of acute onset progressive weakness of all four limbs with fever, headache, body pain & nausea of two days duration without any bladder & bowel problems. He did not sustain any respiratory infection or diarrhea in the preceding days. He never had vaccinations in the near past. Though an occasional alcoholic, he was a non-smoker with no family history of similar illness.

On examination, patient was febrile with other vitals being stable. On general examination, there were no suffused conjunctiva and no calf muscle tenderness. Cardiovascular and respiratory examination was unremarkable; abdomen examination revealed mild non tender hepatomegaly.

The central nervous system examination revealed a flaccid quadriparesis with weakness of the proximal muscles (power 3/5), generalized areflexia and flexor plantar response without any bladder or sensory or cerebellar involvement. Fundus examination - no evidence of optic neuritis.

Investigations

Laboratory investigations revealed haemoglobin of 12gm/dl (12-16gm/dl), total leukocyte count of 16,600/ cumm (4,000-11,000 cells /mm³), Serum bilirubin 0.2mg/dl (upto 1.0 mg/dl) AST 42U/L (12-35U/L) ALT 40U/L (12-35U/L), Creatinine-1.5mg/dl (0.7-1.5mg/dl), Urea- 47mg/dl (13-45mg/dl). His ABG was normal, serum electrolytes revealed hypokalemia with a Potassium level of 2.0 mEq/L (3.5-5.5 mEq/L) and an elevated CPK -total value of 219 IU/L (15-130IU/L).

X ray (Chest PA & Cervical spine), CT brain & spine (non contrast) were normal. USG abdomen revealed hepatomegaly with normal-sized kidneys. ECG showed U waves, ST-T changes in chest leads consistent with hypokalemia. Tests for Dengue IgM, IgG antibodies, RPR, HIV, HBsAg and malarial smear were negative. There was no growth in blood & urine culture.

Leptospirosis antibody Ig M by ELISA method was positive, Ig G was Negative.

A presumptive diagnosis of leptospirosis was made (Modified Faine's Criteria Score- 32- [Part A: 8 Part B: 9 Part C: 15]) {Score>25 is presumptive of leptospirosis} [1].

Urine examination, 24-hour urine protein, Thyroid profile, Blood sugar, Peripheral smear were normal. Spot urine potassium and

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sodium were elevated suggesting kaliuresis {32 mEq/L (Normal<20 mEq/L)}.

Fever improved with Ceftriaxone therapy. Potassium correction was done both, orally and intravenously. Potassium levels were persistently very low which corrected by 10th day to 4.0 mEq/L (3.5-5.5 mEq/L); renal & hepatic functions normalized. He recovered completely without any residual weakness. We also planned to do MRI of brain and spinal cord, since patient showed early clinical improvement to intra venous potassium therapy, it was deferred.

He was advised potassium rich diet and discharged, he is under our regular follow-up.

A final diagnosis of Hypokalemic paralysis (Acute Quadriparesis) secondary to leptospirosis was made.

DISCUSSION

Acute quadriparesis with onset over minutes may result from disorders like anoxia, hypotension, brainstem or cervical cord ischemia, cervical trauma, electrolyte disturbances, toxins, and periodic paralyses [2]. Among the electrolyte disturbances, hypokalemic paralysis is more common than hyperkalemic paralysis. Hypokalemic paralysis with fever may be secondary to dengue, chikungunya and leptospirosis [3].

Flaccid paralysis in leptospiral fever may be due to demyelination (GullianBarre Syndrome), or Transverse Myelitis or Potassium related disorders [4]. Since serum potassium levels were very low at presentation, disorders of demyelination were kept behind in our differential diagnosis. Demyelination is usually a global process which would have produced sensory and autonomic symptoms which were absent in our patient.

In leptospirosis, renal involvement in the form of interstitial nephritis and tubular necrosis is common [Table/Fig-1]. Non oliguric -acute kidney injury (AKI) is reported in 16-40% and is usually mild, it lasts for few days to weeks, averaging 2 weeks, with complete recovery within 6 months [5]. In the setting of interstitial nephritis with hypokalemia the weakness develops rapidly, but improves slowly.

Pathology	Mechanism	Presentation
Interstitial Nephritis	Inhibition of Na ⁺ -K ⁺ pumps	1) Non oliguric renal failure 2) Increased urinary excretion of Na ⁺ -K ⁺
Tubular Necrosis	Ischemia	Oliguric renal failure
Glomerulonephritis	Immune mediated	Hematuria, proteinuria

[Table/Fig-1]: Renal manifestation of Leptospirosis

Hypokalemia caused by kaliuresis is noted in 26%- 40% of patients with leptospirosis and if it assumes alarming proportions, it leads to muscular weakness. The outer membrane proteins of leptospira inhibits Na⁺-K⁺ ATPase which increases intra-cellular Na⁺ levels causing decrease in Na⁺ transport at the luminal border of renal tubules, subsequent increase in sodium delivery to the collecting ducts for Na⁺-K⁺ exchange causes kaliuresis. Increased plasma aldosterone and cortisol levels further enhance hypokalemia [6]. Treatment with high dose penicillin may also cause or enhance the Hypokalemia by renal potassium wasting. Therefore, hypokalemia can occur, even in patients with significant azotaemia [7].

To our knowledge four cases of acute, pure motor quadripareisis due to hypokalemia in leptospirosis has been reported in literature. Most of them had the icteric form of leptospirosis which was not seen in our patient, but the neurological presentation, management, and outcome were similar to the cases reported [7,8].

CONCLUSION

This case report is to highlight the rare clinical presentation of Leptospirosis with Hypokalemic paralysis where the typical

symptoms of conjunctival suffusion & calf muscle tenderness were absent.

Leptospirosis should be a differential diagnosis in any patient who presents with fever, muscle weakness and low serum potassium.

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