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CASE REPORT

A CASE OF LITHIUM INDUCED NEPHROTOXICITY IN A 41 YEAR OLD WOMAN WITH BIPOLAR DISORDER

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ABSTRACT: Many psychiatric drugs improve the quality of life and reduce morbidity significantly. In some rare cases, due to aberrant compliance or dependent behavior by the patient, misuse of the drug can cause systemic complications which far more serious than the initial presenting complaint. We report one such case of prolonged misuse of lithium by a patient which led to the rare complication of irreversible chronic kidney disease.

KEYWORDS: Lithium, nephrotoxicity, bipolar disorder, tremors.

INTRODUCTION: We report here a case of a patient who presented with tremors, ataxia, dyselectrolytemia and elevated renal parameters. Comprehensive history of the patient revealed that she was under treatment with Lithium for the past twenty years. Hence she had developed the very rare complication of Lithium induced chronic kidney disease. Her biochemical test showed substantially increased serum Lithium values, leukocytosis along with dyselectrolytemia. After Lithium correction was initiated, patient was symptomless and had improved lab parameters

Intake of psychiatric drugs is often overlooked by physicians while arriving at a diagnosis for patients suffering from other organic or systemic diseases. As several psychiatric drugs, especially when taken in higher doses can lead to severe systemic illness, it is imperative for physicians to take a detailed history of psychiatric condition medications which will enable the physician to make an accurate diagnosis and initiate an effective treatment.

CASE REPORT: A 48 year old female patient who is a house wife presented to us with complaints of sleeplessness, intermittent episodes of depression, tremors and grinding of teeth for the past one month. Patient was not taking feeds properly for past 1 week. The patient also complained of weakness of all four limbs and inability to walk for one day prior to admission.

On examination the patient was conscious and drowsy. Local examination showed resting tremors of all four limbs and nystagmus. The vitals were stable and the other organ systems appeared normal. Examination of the central nervous system showed that the cranial nerves were intact and spinomotor system examination showed hypotonia and a power of 3/5.

All her deep tendon reflexes were diminished and the plantar showed bilateral withdrawal response. A thorough history of past complaints showed that the patient was on treatment with lithium for the treatment of bipolar disorder for the past two years.

BLOOD INVESTIGATIONS: Complete blood picture showed leukocytosis while biochemical reports showed dyselectrolytemia and an increase of renal parameters. The biochemical investigations revealed reduced serum sodium and potassium levels and as trans-tubular potassium gradient was 4.4, renal loss of electrolytes was suspected. Serum Lithium value was greatly elevated at 1.6 mmol/l.

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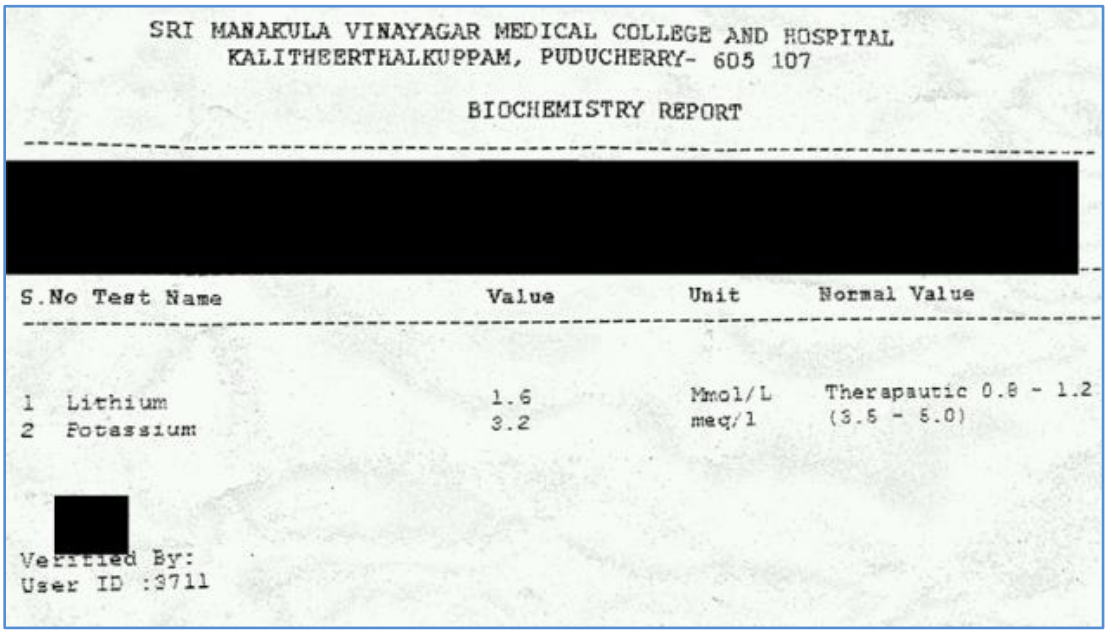

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BIOCHEMISTRY REPORT

[redacted]

S.No	Test Name	Value	Unit	Normal Value
1	Lithium	1.6	Mmol/L	Therapautic 0.8 - 1.2
2	Potassium	3.2	meq/l	(3.5 - 5.0)

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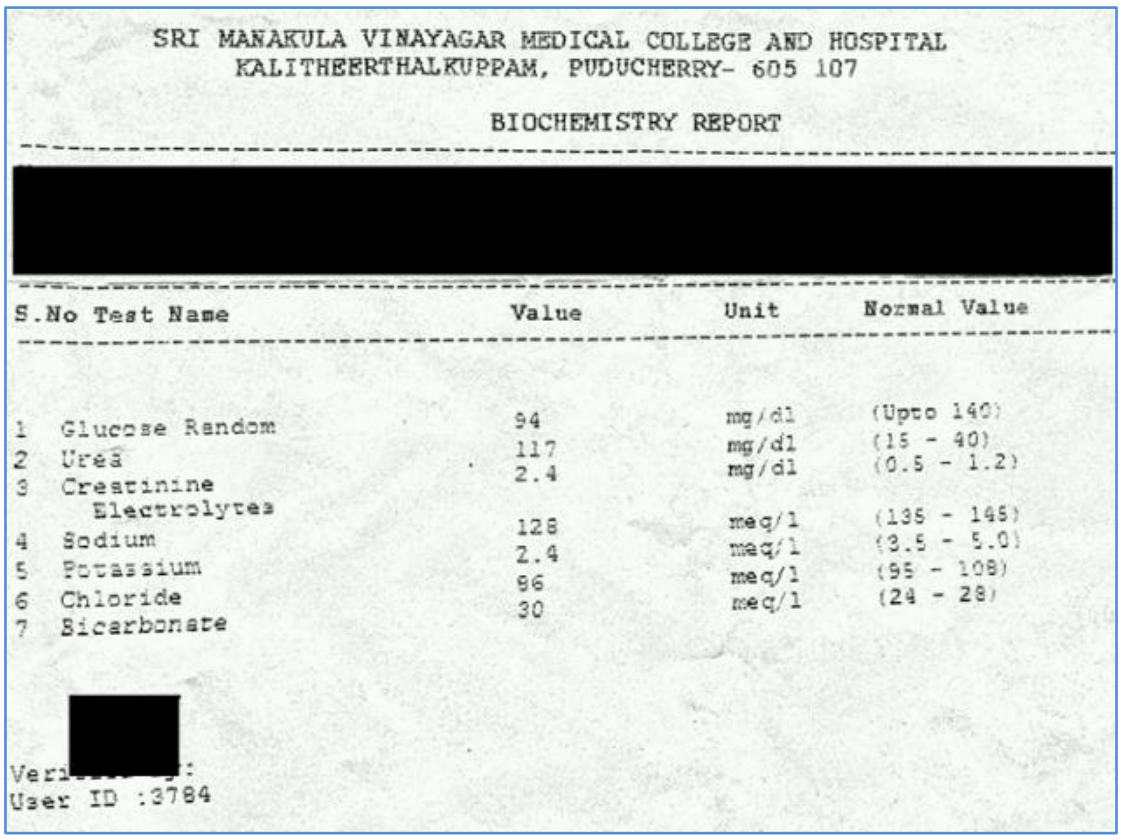
Fig. 1: Lithium levels



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BIOCHEMISTRY REPORT

[redacted]

S.No	Test Name	Value	Unit	Normal Value
1	Glucose Random	94	mg/dl	(Upto 140)
2	Urea	117	mg/dl	(15 - 40)
3	Creatinine	2.4	mg/dl	(0.5 - 1.2)
	Electrolytes			
4	Sodium	128	meq/l	(135 - 145)
5	Potassium	2.4	meq/l	(3.5 - 5.0)
6	Chloride	96	meq/l	(95 - 108)
7	Bicarbonate	30	meq/l	(24 - 28)

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Fig. 2: Renal parameters and Serum electrolytes

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Parameter	WBC	Neutrophils	Lymphocytes	RBC	Platelets	Haemoglobin
Values	17,600/ cu mm	82%	14%	42.6 lakhs/ cu mm	5.28 lakhs/ cu mm	12.3 gms/dl

Table 1: Complete blood picture

Parameters	Sr. Sodium	Sr. Potassium	Sr. Bicarbonate	Sr. Chloride
Values	128 meq/l	2.4 meq/l	30 meq/l	86 meq/l

Parameters	Sr. Lithium	Sr. Calcium	Sr. Uric acid	Sr. Phosphorous
Values	1.6 mmol/l	8.2 mg/dl	8.4 mg/dl	3.5mg/dl

Table 2: Serum electrolytes

Parameters	Urea	Creatinine	Spot Sodium	Spot Potassium	Spot protein	Albumin	Sugars	Pus cells	RBC
Values	117 mg/dl	2.4 mg/dl	50.3 meq/l	45.2 meq/l	71 mg%	+	Nil	2-3	Nil

Table 3: Renal parameters

Parameter	TSH	T4
Values	1.3mIU/ml	1.2 ng/ml

Table 4: Thyroid function tests

Ultrasound of abdomen confirmed the presence of bilateral renal parenchymal disease, small sized kidney and showed increased parenchymal echoes.

Fig. 3: Ultrasound images showing chronic kidney disease in left and right kidney respectively.

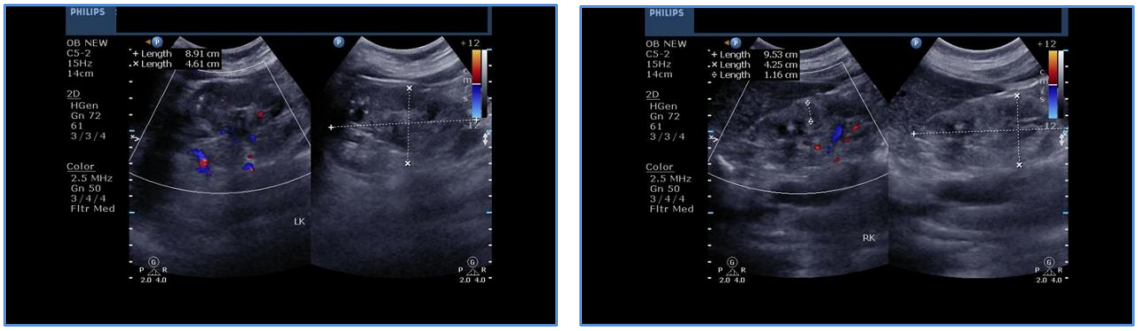

Fig. 3

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Fig. 4: ECG -'U' waves characteristic of hypokalaemia

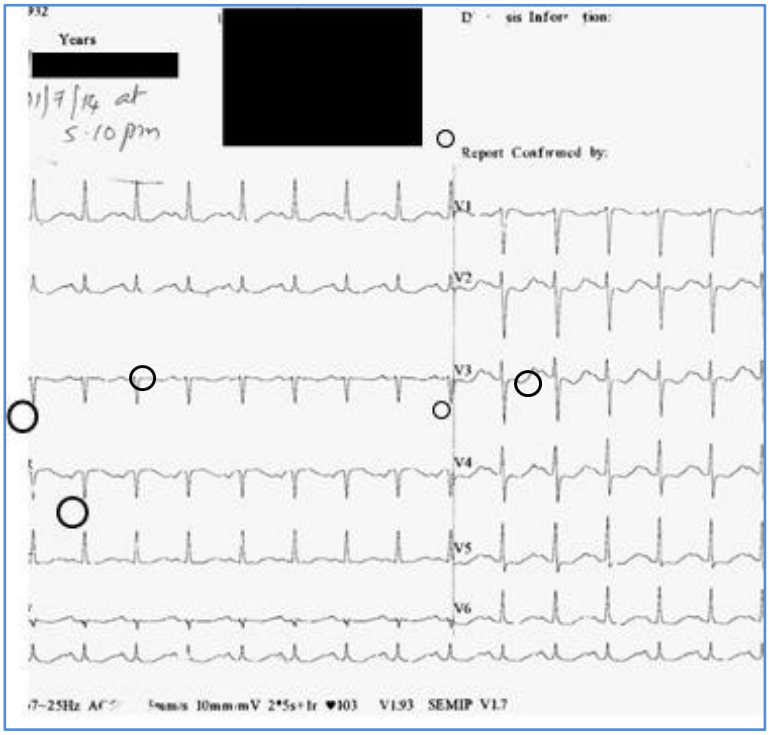

Fig. 4

Upon discontinuation of lithium and other electrolyte correction, the patient showed gradual but considerable reduction of symptoms. Biochemical analysis showed a correction of lithium, sodium and potassium. The patient was symptomless after one week. After a psychiatric review she was started on Quetiapine and Divalproex as an alternative to lithium for the treatment of her bipolar disorder

DISCUSSION: Lithium is an effective drug in patients with recurrent bipolar disorder type 1 and is used as an anti-suicidal and neuro-protective drug. However it has a very narrow therapeutic window therefore meticulous monitoring of its serum levels is essential.

Though the mechanism of action of lithium is not completely understood, the following theories have found widespread acceptance:

1. Lithium partly replaces body sodium is nearly equally distributed inside and outside the body cells.
   This may affect the ionic fluxes across brain cells and modify the conduction property of cellular membranes.
2. Lithium has been found to decrease the release of noradrenaline and dopamine in the brain of treated animals without affecting 5-HT release. This may correct any imbalance in the turnover of brain monoamines.
   As far as other systems are concerned, Lithium inhibits the action of ADH on distal tubules and cause diabetes insipidus-like state. It has some insulin-like action on glucose metabolism.

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Leucocyte count is increased by lithium therapy. Lithium reduces thyroxine synthesis by interfering with iodination of tyrosine.

DRUG INTERACTIONS OF LITHIUM:

1. Loop and thiazide diuretics.
2. NSAIDS.
3. Busipirone.
4. Opioids like Pethidine, Tramadol, Oxycodone and fentanyl.
5. Antidopiminergic agents.
6. ACE-inhibitors.[1]

SIDE EFFECTS, OVERDOSE AND TOXICITY OF LITHIUM: Lithium may cause constitutional symptoms such as;

- Headache.
- Amnesia.
- Nausea and vomiting.
- Confusion.
- Hair loss/thinning.

HAZARDOUS SIGNS:

- Tremors.
- Ataxia.
- Dysarthria.
- Nystagmus.
- Convulsions.
- Renal impairment (rare).[2]

Many severely poisoned patients can develop a syndrome of irreversible lithium-effectuated neurotoxicity (SILENT)[3] such as cognitive impairment, sensorimotor peripheral neuropathy, and cerebellar dysfunction.

FATAL DOSE: Over dosage, usually with plasma concentrations of greater than 1.5 mmol/l of lithium may cause serious toxicity and a concentration of greater than 2.5 mmol / l is usually fatal.[4]

DIAGNOSIS: The estimation of serum lithium concentration along with a thorough clinical examination with an emphasis on looking for hazardous signs of toxicity remains the cornerstones of diagnosis.

TREATMENT:

- Immediate stoppage of Lithium along with initiation of therapy with substitutes to combat psychiatric exacerbations.
- Symptomatic treatment of constitutional symptoms.
- Corrections of electrolyte imbalance if present.

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- Treatment of hypothyroidism if present.
- Treatment of any neurological and renal disorders if present.

ALTERNATIVES TO LITHIUM:

1. Carbamazepine.
2. Sodium Valproate.
3. Lamotrigine.
4. Topiramate.

Atypical antipsychotics like Olanzapine, Risperidone and newer atypical antipsychotics; Aripiprazole, Quetiapine and Divalproex are now the first line drugs for control of acute mania.

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