Acute Onset of Parkinsonism an End-Stage Renal Disease Patient

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Abstract-

Purpose: The osmotic demyelination syndrome (ODS) has been identified as a neurological complication of the rapid correction of hyponatremia. In recent years, however, various medical conditions have been associated with the development of ODS, irrelevant to changes in serum sodium. We present a rare case of a eunatremic patient who developed ODS with manifestation of parkinsonism.

Case: A 55 years old woman who has hypertension, type 2 diabetes nephropathy in end-stage renal disease under maintenance hemodialysis came to us with complaint about newly developed resting tremor of bilateral upper limbs, slowness of movements and small shuffling steps. Brain magnetic resonance imaging (MRI) showed bilateral lentiform nuclei demyelination. ODS was diagnosed concerning the comorbidities and her medical history. Her neurological deficits improved dramatically after treatment of Ropinirole.

Conclusion: ODS may develop in patient with risk factors regardless of change in serum sodium concentration. Brain MRI could help in early detection of the demyelination. Secondary parkinsonism may occur as a rare manifestation of ODS. Supportive treatment, monitoring of vital signs and neurological deficits are warranted. Dopaminergic agent may be beneficial in symptomatic control.

Key Words: Osmotic demyelination syndrome; Extra-pontine myelinolysis; Parkinsonism.

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INTRODUCTION

Newly developed parkinsonism is a common complaint not only in neurological out-patient department, but also in ordinary ward, intensive care unit, and emergent department. According to the chronicity and comorbidities, parkinsonism could always be attributed to several etiologies such as iatrogenic, vascular related, or neurodegenerative diseases.

Osmotic demyelination syndrome (ODS) is a rare, potentially life-threatening condition mainly causes by rapid correction of hyponatremia. The demyelination predominantly involves the central pontine area and the patient may present with consciousness decline, bulbar symptoms, and ataxia. Parkinsonism or other movement disorders such as dystonia may also occur. Occasionally, the demyelination may involve extra-pontine areas including basal ganglion and deep cerebral

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white matter. Rarely, the patient may have isolated extra-pontine demyelination. We present a case of acute onset parkinsonism in end-stage renal disease patient receiving maintenance hemodialysis without evidence of rapid change in serum sodium level.

CASE

A 55 years old woman has hypertension, type 2 diabetes with nephropathy, and end-stage renal disease with maintenance hemodialysis three times a week under regular medical control for several years. She visited our emergent department complaining about newly developed resting tremor of bilateral upper limbs for 5 days followed by slowness of movements, small shuffling steps, drooling and mask face. She denied fever, smoking, alcoholism, or any recreational drug abuse. The patient's initial emergency department examination revealed a normal pulse rate (70/min), blood pressure (158/74 mmHg), and temperature (36.1 °C). She was alert and well-oriented with coherent albeit dysarthric speech. Her pupil diameters were symmetrically 3 mm and responded normally to light. Cranial nerve examination revealed a freely conjugated gaze without nystagmus. Her corneal and oculocephalic reflexes were intact. She had intact sensory function and normal muscle power in all extremities. Her biceps, triceps, knee, and ankle reflexes were symmetrical with bilateral plantar flexor responses. Her motor coordination was clumsy bilaterally. Her muscle tone showed rigidity. Postural instability was observed during retropulsion test. The brain computed tomographic (CT) scan showed hypodense change over bilateral basal ganglion and acute ischemic stroke was initially suspected (Figure 1A). However, the brain magnetic resonance imaging (MRI) showed symmetric swelling and hyperintensity on T2-weighted image over bilateral lentiform nuclei with restricted diffusion on diffusion weighted imaging (DWI), which indicated demyelinating change (Figure 1B). Although her serum sodium was 132 mmol/L and there was no history of recent hyponatremia and sodium supplement, the diagnosis of osmotic demyelination syndrome was made concerning the comorbidities and medical history of the patient. The patient was treated with Ropinirole 0.25mg twice daily. The symptoms of parkinsonism then subsided gradually and totally disappeared 2 week later. The Ropinirole was then tapered and eventually discontinued with no recurrence of the Parkinsonism. The follow-up brain MRI showed almost fully recovered of the demyelinating change 3 months later (Figure 1C).

DISCUSSION

Osmotic demyelination syndrome is an uncommon, non-inflammatory demyelinating disorder first described in 1959 by Adams and Victor [(1)], which mainly causes by rapid correction of hyponatermia. It has been reported that approximately 60% of ODS patients have central pontine myelinolysis (CPM), 30% have concurrent CPM and extra-pontine myelinolysis (EPM), and only 10% have isolated EPM [(2)]. The possible risk factors thought to be associated with this condition other than rapid correction of hyponatremia including diabetes mellitus, renal failure, hemodialysis, severe hypophosphatemia and hypokalemia,

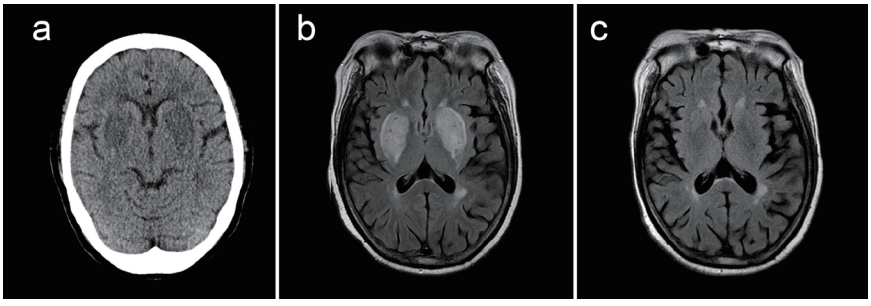

Figure 1. (a) Brain CT showed symmetrical hypodensities in the bilateral lentiform nuclei. (b) Brain MRI showed the bilateral basal ganglia show symmetric swelling hyperintensity on T2-FLAIR image. (c) Follow-up of brain MRI magnetic resonance imaging showed unremarkable finding in the bilateral basal ganglia.

hyperemesis gravidarum, anorexia nervosa, Wilson disease, severe burns, and systemic lupus erythematosus [2]. However, the precise mechanism and illumination of such selective demyelination lesions of ODS in the basal ganglia, pons or midbrain has not been well-elucidated. Norenberg et al. had proposed that ODS lesions are favored areas of a rich gray-white matter apposition. The myelinotoxic factors released from the gray matter were induced by osmotic stress related endothelial alterations [3]. Moreover, Ashrafian et al. hypothesized that the demyelination of cells may be caused by apoptotic process provoked by imbalanced energy supply demand, especial in diabetic and alcoholic patients with malnourished states [4].

Patients of ODS may present with seizures, bulbar symptoms, quadriparesis, movement disorders such as parkinsonism and dystonia, conscious disturbance, and even lock-in syndrome in the most severe cases [5]. Magnetic resonance imaging (MRI) is the most sensitive technique for detecting demyelination and is increasing available worldwide. The MRI findings including symmetric hyperintense change in the central pons or extra-pontine area including basal ganglion and deep cerebral white matter at T2-weighted and FLAIR imaging with decreased T1 signal intensity without enhancement or mass effect. Restricted diffusion on DWI has been reported as the first imaging manifestation [6].

In our case, the patient developed ODS without recent experience of rapidly correction of hyponatremia. However, multiple risk factors of the patient including diabetes mellitus, end-stage renal disease, and hemodialysis could still be the causes of ODS.

Furthermore, our case also illustrates the rare clinical entity that acute onset of parkinsonism could be the initial presentation of ODS which should always be considered in approaching patients with newly developed parkinsonism and the possible risk factors mentioned above. EPM is a rare cause of secondary Parkinsonism. The pathogenesis of the parkinsonian syndrome in ODS is not fully understood, which is thought to be resulted from a relative dopamine deficiency because of reduction of dopamine receptors on myelinated fibers in the striatum and of the presynaptic striatal dopamine transporter. Improvement of the symptoms and complete recover from the parkinsonism by dopaminergic therapy have been reported [7]. Symptoms of parkinsonism subsided after administration of Ropinirole and supportive treatment.

However, there are some limitations regarding to our case. The clinical improvement of parkinsonism symptoms may not be necessarily caused by Ropinirole effect but result from resolution of demyelination instead. Besides, inflammatory demyelinating disease or encephalitis could not be excluded due to absence of CSF analysis. Clinical evidence of the correlation among the course of demyelination, the parkinsonism symptoms and the response of dopaminergic agonist would be more convincing if these flaws had been corrected.

In conclusion, ODS may develop in patient who has the risk factors even without rapid elevation in serum sodium concentration. A brain MRI could help in early detection of the demyelinating change and should be performed in patients who were suspected to have ODS. As ODS could induce secondary parkinsonism, a through medical history should be obtained and the blood test should include concentrations of sodium, potassium, phosphate and creatinine when approaching patient who has recent onset of parkinsonism. Eventually, in patients that ODS is confirmed, supportive treatment and closely monitoring of vital signs and neurological condition is necessary. Intensive care may be required in critical cases. For the treatment of parkinsonism symptoms, dopaminergic therapy has been reported effective and may be a choice in symptom control.

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