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Osmotic myelinolysis in a normonatremic patient

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Abstract

Osmotic demyelination syndrome is usually associated with hyponatremia or rapid correction of this condition. The prognosis is usually fatal. We treated a 34-year-old chronic renal failure patient who did not have hyponatremia but developed severe pontine myelinolysis demonstrated with MRI. Serial MRI revealed gradual reduction of the lesions over 2 months. This case demonstrates that osmotic demyelination syndrome is not always associated with hyponatremia, and that, although the prognosis is usually poor, some patients recover.

Key words : Osmotic demyelination syndrome ; central pontine myelinolysis ; chronic renal failure ; normonatremia.

Introduction

Osmotic demyelination syndrome (ODS), previously known as central pontine myelinolysis (CPM), was first described as a clinical entity in 1959 (1). Experimental and clinical data have suggested a possible relationship between ODS and rapid correction of hyponatremia, but there are also a few reports of ODS in both normonatremic and hypernatremic patients (2-5). The disease is most often seen in chronic alcoholic and hyponatremic patients. Other associated conditions include diabetes mellitus, hepatocellular dysfunction, chronic renal failure, pituitary surgery, liver transplantation, and chemotherapy (4). ODS has also been reported in association with conditions such as dialysis disequilibrium syndrome, lithium toxicity, hypokalemia with renal tubular acidosis, correction of hyperammonemia, and hypophosphatemia (6, 7). Myelinolysis has also been reported in relatively healthy persons who have developed hyponatremia related to gastroenteritis or diuretic therapy (8).

The typical initial symptoms of myelinolysis are mutism and dysarthria. Lethargy, altered mental status, and affective changes are also common. The classic later symptoms of myelinolysis (spastic quadriparesis and pseudobulbar palsy) reflect damage to the corticospinal tracts in the basis pontis (2, 8). Additional symptoms such as cranial nerve involvement, ataxia, behavioral changes or movement disorders arise if lesions extend to the midbrain, medulla oblongata, or pontine tegmentum (8). "Locked-in" syndrome can develop rapidly in individuals that have large lesions in the basis pontis.

Outcomes vary in patients with myelinolysis. Some of these individuals die and others recover completely or only partially (8).

Case report

A 34-year-old male presented with a progressive 4-day history of diplopia, difficulty with lateral gaze, difficulty swallowing, vertigo, unsteadiness, nausea, vomiting, and fatigue. He had had chronic renal failure of unknown etiology for 6 years, and was undergoing dialysis three times weekly.

Neurological examination revealed severe bilateral horizontal conjugated gaze paralysis, nystagmus on lateral gaze, bilateral facial hypoesthesia, bilateral peripheral facial paralysis, bilateral palatal arch paralysis, mild hemiparesis (4/5), and extensor plantar reflex on the left. The deep tendon reflexes were normale and there was no dysmetria or dysdiadochokinesia, however the patient was severely ataxic.

The laboratory test results on admission were normal except high blood urea nitrogen (44 mg/L ; normal range 10-21 mg/d), and creatinine (5.5 mg/L, normal range 0.5-1.3 mg/dl) levels. The blood electrolyte levels were normal [sodium 135 mEq/L (normal range 135-146 mEq/L)]. The dialysis records showed that the patient's blood sodium levels were also within normal limits before he was hospitalized (range for the previous 2 months, 136-148 mEq/L). Computerized tomography of the brain performed on the day of admission was normal. Based on the clinical and laboratory findings, the differential diagnosis at this stage included osmotic demylination syndrome, brainstem infarction, and the Miller Fisher variant of Guillain-Barre syndrome.

Lumbar puncture revealed normal results. Cranial MRI performed on day 2 of hospitalization

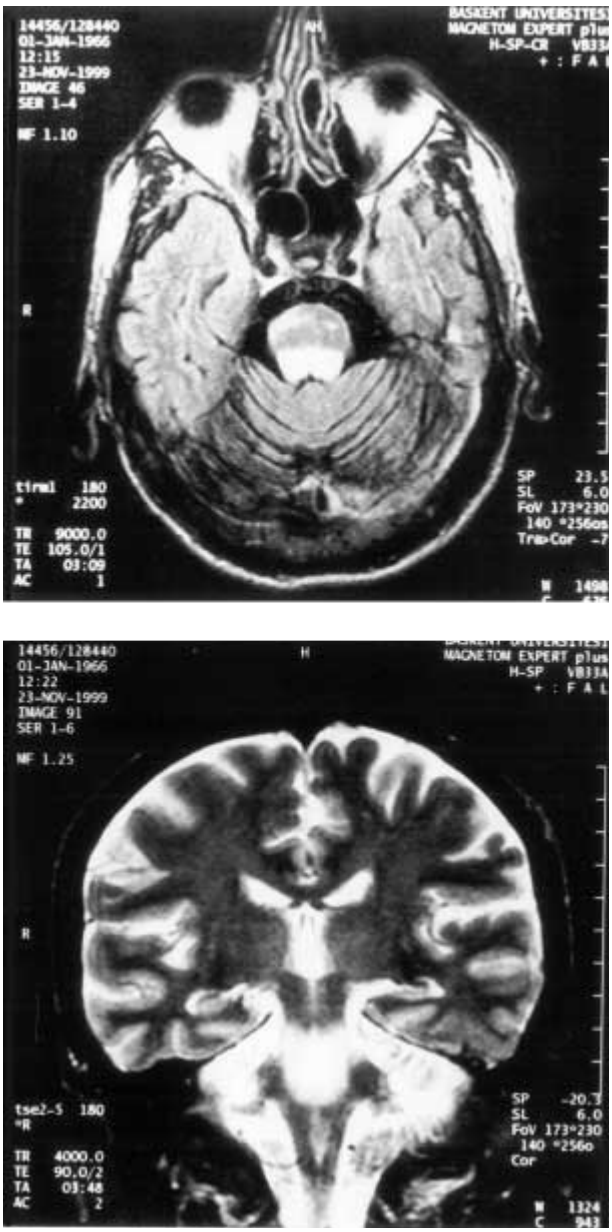

FIG. 1. — Axial and coronal T2-weighted images show a symmetrical area of hyperintensity in the basis pontis, and a less prominent hyperintense lesion in the right upper pons.

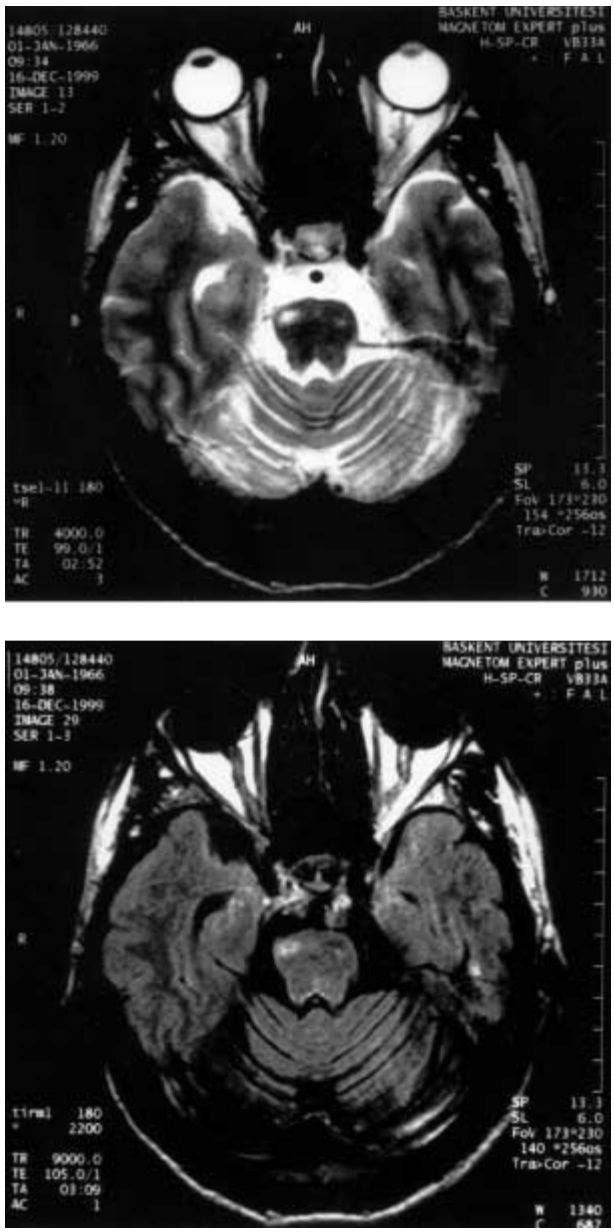

FIG. 2. — Axial T2-weighted images obtained 2 months later show decreased signal intensity of the lesion within the pons.

showed symmetrical lesions in the basis pontis that extended to the mesencephalon, and a less prominent lesion in the right upper pons. The lesions were hypointense on T1-weighted images and hyperintense on T2-weighted images, and did not enhance with contrast injection. The features were consistent with edema (Fig. 1).

The patient was prescribed more frequent dialysis sessions, but no other treatment was given. On the 10th day of hospitalization, he started to recover slowly. One month later, he was symptom-free and a repeat neurological examination revealed normal findings. The MRI-detected trident-shaped lesion in the base of the pons gradually resolved over 2 months' time, and the other smaller lesion also became less prominent (Fig. 2).

Discussion

The exact mechanism behind this selective process of demyelination remains obscure. Endo et al. described five chronic renal failure patients on dialysis who had central and extrapontine myelinolysis, and concluded that there is no reliable explanation for myelinolysis in the uremic state (9). There is also no proven explanation for the location of ODS lesions, but Nuremberg et al. and other authors have focused on lesion occurrence within areas of rich gray-white matter apposition (10). Their theory is that osmotically induced endothelial changes lead to the release of myelinotoxic factors. These derive mainly from gray matter, which is five times more vascular than white

matter. If this hypothesis is valid, the high gray-white matter apposition found in the pons would provide a suitable environment for the development of osmotic myelinolysis.

The MR images may show large symmetrical lesions in the basis pontis, usually sparing the ventral pons, or there may be smaller "butterfly" or trident-shaped lesions in the base of the pons. The initial MRI images may reveal nothing abnormal, particularly within 1 week after the onset of symptoms. The images probably reflect a combination of edema and demyelination. As the acute process subsides with time, the lesion may become smaller (4, 7, 11, 12). Although contrast enhancement of ODS lesions has been described, this was not a feature of our case (3). The differential diagnosis for the clinical and MRI pictures of ODS includes diffuse hypoxic encephalopathy and brainstem and thalamic infarction from thrombosis of the basilar artery (3).

In our case there was no reported episode of severe hypotension or cardiopulmonary arrest that would cause diffuse hypoxic encephalopathy, or an acute development of symptoms suggesting a cerebrovascular event. Also brain MR angiography revealed completely normal cerebral vasculature. Lumber puncture results showed no signs of an infectious or an inflammatory disease. The progressive presentation of brain stem signs and symptoms, and the appearance of the MRI lesions suggested that myelinolysis was the cause. The only risk factor for this patient was his being on dialysis. The improvement of his clinical findings only by more frequent dialysis sessions also supported this thought.

This case is noteworthy because it shows that ODS is not always associated with hyponatremia which has only been shown in a few other case reports in the literature. The case also underlines that, although the prognosis is usually poor, some patients recover along with partial or complete resolution of the MRI-detected lesions. This case is atypical for the location of the lesion in the posterior part of pons rather than in the central part.

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