Medical Image of the Week: Osmotic Demyelination

Figure 1. MRI of the brain with FLAIR hyperintensity within the pons (see arrow), no stroke or watershed infarction.

A 59 year-old woman with past medical history of diabetes mellitus type II and end stage renal disease (ESRD) on hemodialysis (HD) presented with a right ankle fracture. She missed two days of HD. Fifteen minutes into HD, she became confused, hypotensive, bradycardic and then unresponsive with generalized body stiffness for approximately one minute. She never lost her pulse. Her vital signs returned to normal spontaneously after this episode. Patient was intubated for airway protection because she was obtunded.

On examination, while she was off sedation, her eyes were open but she did not track or follow commands. She had a positive cough, gag and corneal reflex but oculocephalic reflex was absent with dysconjugate gaze. She had intact brainstem reflexes but absence of deep tendon reflexes. She had no movements of her upper extremities and did not withdraw to painful stimulus. MRI of the brain was obtained to rule out acute stroke and showed FLAIR hyperintensity within the pons, no stroke or watershed infarction (Figure 1). Laboratory showed no acute changes of sodium levels or glucose level.

After 7 days of hospitalization, she started to track with her eyes and follows commands. She was extubated on day 15 of hospital stay and was discharged to a rehabilitation center after a total of 25 days of hospital stay. She was awake, alert and oriented to time, place, and person and able to talk and move all four of her extremities.

The rapid deterioration of mental status with acute neurological changes in this case is typical for osmotic demyelination syndrome (ODS). The exact mechanism behind the demyelination remains not well understood but involves the inability of brain cells to respond to rapid changes in osmolality, and hence destruction of myelin and neurons. It can also occur in chronically debilitated patients without osmolality shift and ESRD may be a risk factor (1,2). MRI 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 especially in the acute phase (3).

ODS should be considered in ESRD patients who present with any neurological symptoms, unexplained behavioral disorder or neurologic signs related to the pons or brainstem region. ODS secondary to dialysis has favorable prognosis.

Jennifer J. Huang, DO¹

Judy Dawod, MD²

¹Sarver Heart Center and ²Neurology Department

University of Arizona

Tucson, AZ USA

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