Meningitis-retention Syndrome: First Case of Urodynamic Follow-up

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Abstract

The combination of acute urinary retention and aseptic meningitis has not been well recognized. This combination can be referred to as meningitis-retention syndrome (MRS), when accompanied by no other abnormalities. However, the responsible site of lesions for urinary retention in MRS remains obscure, despite the areflexic detrusor at the time of urinary retention. We recently encountered a man with MRS in whom a urodynamic study was performed twice. In that case, an initially areflexic detrusor became overactive after a 4-month period, suggesting an upper motor neuron bladder dysfunction.

Key words: meningitis-retention syndrome, acute disseminated encephalomyelitis, bladder dysfunction, spinal shock

(Intern Med 50: 1329-1332, 2011)
DOI: 10.2169/internalmedicine.50.4747

Introduction

Although aseptic meningitis is a common neurological disorder, the combination of aseptic meningitis and acute urinary retention has not been well recognized. Sakakibara et al referred to this peculiar combination as meningitis-retention syndrome (MRS), since patients with MRS exhibit no other abnormalities, other than mild pyramidal involvement (1, 2). Conversely, because of the presence of mild pyramidal involvement (suggesting spinal cord involvement) and increased myelin basic protein in the cerebrospinal fluid (CSF) (suggesting demyelination), MRS is considered to be a very mild form of acute disseminated encephalomyelitis (ADEM). MRS has a benign and self-remitting course. Therefore, the responsible site of lesions for urinary retention in MRS remains obscure (2), except for areflexic detrusor at the time of urinary retention. Recently, we encountered a man with MRS in whom a urodynamic study was performed twice. In that case, his initially areflexic detrusor became overactive after a 4-month period, suggesting an upper motor neuron bladder dysfunction.

Case Report

A 62-year-old man began to have mild pharyngeal pain with a fever of 39.0°C. He visited a local clinic but the results of his blood test were almost normal, including a C-reactive protein level of 0.03 IU/mL. Three days later, he developed a headache. Four days later, he gradually developed a mild staggering gait, disorientation, urge urinary incontinence, constipation and abdominal distention. Therefore, he was admitted to our hospital. Transurethral catheterization revealed 1,000 mL of residual urine, and an indwelling Foley catheter was inserted into the bladder. He had no skin eruption including in the perineal area. He had mild disorientation to place. Neurological examination showed a marked stiff neck. Although lower extremity reflexes were normal, he had extensor planter response in the left side. His sensation was normal including in the perineal area. A laboratory examination showed mild leukocytosis of 11,590/mm³ but normal C-reactive protein. There was no ab-
normality in blood chemistry and urinalysis except for a mildly increased total bilirubin of 1.6 mg/dL (normal<1.0 mg/dL) and a decreased serum sodium level of 120 mEq/L (135 mEq/L<normal<145 mEq/L). He had mild diabetes (fasting blood glucose level of 144 mg/dL, normal<110 mg/dL; HbA1c 6.3%, normal<5.8%). A decreased serum sodium level, together with an increased serum anti-diuretic hormone level of 5.37 pg/mL (0.3<normal<4.2 pg/mL), suggested the inappropriate secretion of antidiuretic hormone (SIADH). The cerebrospinal fluid (CSF) examination showed mononuclear leukocytosis of 71/mm³, increased protein content of 146 mg/dL, and a mildly decreased glucose level of 56 mg/dL (39% of serum glucose). Bacterial smears and cultures, including tuberculosis and cryptococcus, were negative. The CSF enzyme immunoassay showed negative IgM and IgG antibodies of herpes simplex type-1 (HSV-1) and herpes zoster viruses (VZV). The chest X-ray was normal, while abdominal X-ray revealed an intestinal pseudo-obstruction in the small and large bowel. Results of a nerve conduction study were normal. Magnetic resonance imaging (MRI) scans of the brain and the spinal cord were normal. From the clinical-laboratory findings, we initially suspected meningoencephalitis due to HSV-1, and started 1,500 mg/day of aciclovir. On the 13th hospital day the CSF findings peaked, e.g., mononuclear leukocytosis of 219/mm³, increased protein content of 176 mg/dL. Afterwards all his clinical-laboratory findings gradually ameliorated, although there was no evidence of a virus titer change in the follow-up CSF examination. After removal of the balloon catheter, he was unable to urinate at all. Therefore, he was taught clean, intermittent self-catheterization (CISC) four times a day, while he performed CISC more than 6 times a day because of urination sensation. Around 200 mL of urine was drained with each CISC. Laboratory data showed that there was an increase in myelin basic protein of 246 ng/mL (normal<4.0), increased bladder sensation. We then stopped infusing saline into the bladder. He did not show detrusor overactivity during filling (Fig. 1, upper panel), even after provoking maneuver by coughing. When we asked him to void, however, he was unable to contract his bladder at all (areflexive detrusor). The sphincter EMG activity disappeared on attempt of voiding. Analysis of external sphincter EMG (4) revealed a long duration (number of units with a duration of more than 10.0 ms, 30%, normal<20%; while mean duration 6.87 ms, normal<10.0 ms) neurogenic motor unit potentials. No de-celerating bursts (“whale noises”) were observed. Abdominal echography ruled out prostatic hypertrophy, with a prostatic volume of 15.2 mL (normal<20.0 mL).

In order to ameliorate the voiding difficulty, we started him on 15 mg/day of distigmine chloride (acetylcholinesterase inhibitor) and 8 mg/day of silodosin (alpha-blocker). These treatments gradually ameliorated his voiding difficulty, and two months later, distigmine was terminated, silodosin was tapered to 4 mg/day, and his residual urine volume became less than 50 mL. CISC was terminated at that time. His voided volume was not measured, but approximately it was 200 mL. On the 53rd day he was discharged from the hospital.

The second urodynamic study (5 months after admission, under 4 mg/day silodosin)

At the time of the second urodynamic study, he had poor flow, nighttime urinary frequency of 3 times, daytime urinary frequency of 10 times, and no urinary incontinence. He used laxatives but had a daily bowel movement. He did not have fecal incontinence.

Free flow could not be obtained, whereas he voided by himself in a toilet 100 minutes before the urodynamic study. Transurethral catheterization revealed 102 mL of urine, suggesting that he had no post-void residuals. Sphincter EMG revealed normal voluntary contraction of the sphincter. During bladder filling, he had a first sensation at 50 mL (100 mL<normal<300 mL) and a bladder capacity of 350 mL (200 mL<normal<600 mL); we then stopped infusing saline into the bladder. During bladder filling, he showed increase detrusor pressure at the end of bladder filling (probably slow detrusor overactivity, with initial horizontal segment before the start of increase detrusor pressure) (Fig. 1, lower panel). When we asked him to void, he was able to contract his bladder despite the filling phase slow detrusor overactivity. The sphincter EMG activity disappeared completely initially, but it appeared again suggesting incomplete detrusor-
sphincter dyssynergia. He dribbled with a minimum voided volume. Whereas no urinary flow or pressure-flow curve was obtained, preserved bladder contraction with poor flow indicated obstructive voiding pattern.

**Discussion**

The clinical manifestations of the present patient are basically the same as those of the previously reported cases of MRS (1, 5, 6). All patients had symptoms and signs of meningeal irritation such as headache, stiff neck, and a positive Kernig’s sign. In addition, our patient exhibited mild encephalitic signs initially, e.g., the patient had mild disorientation to place and a staggering gait. However, these might also be attributed to the SIADH in our patient. Mild encephalitic signs were also reported by Fukagai et al (7), whose patient had drowsiness without meningeal irritation.

In the reported cases of MRS, the CSF examinations have shown mononuclear pleocytosis of 38-370/mm³, normal to increased protein content (up to 260 mg/dL), and normal to mildly decreased glucose content (up to 33% of that in the serum). All viral titers studied in the CSF and the serum in...
MRS were negative, including HSV-1, VZV, coxsackie, echo, mumps, measles, rubella, adeno-, and cytomegaloviruses, although the other viral titers were not exclusively studied. In contrast, whereas the brain and spinal cord MRI tends to be normal, myelin basic protein (1) and an oligoclonal band can be detected in the CSF, as observed in our patient, suggesting that MRS is a very mild form of ADEM. It is known that a subset of patients with myelitis (8, 9) or ADEM (10) present with urinary retention alone initially or as the only sequel of this disease. The lower urinary tract innervation is selectively vulnerable on such an occasion.

Urinary retention in MRS has a neurologic etiology, since none of the reported cases, including the present case, had urologic abnormalities such as urinary tract infection, genital prolapse, or apparent prostatic hypertrophy, and there was a strong chronological association in that the urinary retention appeared simultaneously or just after the occurrence of the aseptic meningitis. However, the lesion site responsible for urinary retention in MRS remains obscure. Urodynamic study results showed that all patients studied had an areflexic detrusor, which results in an inability to contract the bladder properly on voiding, with few patients also having an unrelaxing sphincter (1). An areflexic detrusor originates from various lesion sites in the neural axis, e.g., either a lower or upper motor neuron lesion. Urinary retention with an upper motor neuron lesion typically appears in the acute spinal shock phase initially (11, 12). Then it might return to normal or change to detrusor overactivity (11, 12). Similarly, the present case was revealed to have an areflexic detrusor on voiding. According to the filling phase in the first urodynamic study, our case also had increased bladder sensation. We still do not know the exact mechanism of increased bladder sensation. However, provided that this case has spinal cord pathology as described below, sodium channel expression might be altered in the spinal dorsal horn neurons and thalamus (13). This altered sodium channel expression contributes to pathologic amplification of innocuous and noxious inputs in the central nervous system structures (13). Similarly, a spinal cord lesion above the lumbar sacral cord can indirectly influence the properties of bladder afferent neurons (13). The present case had 1,000 mL of residual urine on admission. However, 1,000 mL of residual urine occurring only once might not be enough to produce over-distention bladder injury. Similarly, an indwelling Foley catheter for only two weeks might not be enough to alter bladder function.

To the best of our knowledge, this is the first MRS case to undergo a repeat filling phase urodynamic study, showing slow detrusor overactivity four months after areflexic detrusor. The chronological change in the bladder behavior in our patient indicates that an upper motor neuron lesion was mainly responsible as the mechanism of urinary retention. According to the voiding phase in the second urodynamic study, the sphincter EMG indicated incomplete detrusor-sphincter dyssynergia that also suggests an upper motor neuron lesion. Detrusor-sphincter dyssynergia might lead to an obstructive voiding pattern (14), as indicated in our patient. In the second urodynamic study, our patient was taking silodosin, an alpha-blocking agent, which might have lessened the detrusor-sphincter dyssynergia and obstructive voiding pattern. However, it is not likely that silodosin contributed to the detrusor overactivity in the second urodynamic study in our case.

In conclusion, we treated a man with MRS in whom a urodynamic study was performed twice. His initially areflexic detrusor changed to a slow detrusor overactivity after a 4-month period, suggesting an upper motor neuron bladder dysfunction.

The authors state that they have no Conflict of Interest (COI).

References