INTERNAL MEDICINE

□ CASE REPORT □

Moxibustion, an Alternative Therapy, Ameliorated Disturbed Circadian Rhythm of Plasma Arginine Vasopressin and Urine Output in Multiple System Atrophy

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Abstract

Previously no alternative therapy approach has been made to ameliorate disturbed circadian arginin vasopressin rhythm (C-AVP-R) in multiple system atrophy (MSA). A 65-year-old man with MSA showed loss of C-AVP-R and nocturnal polyuria. We performed moxibustion at specific acupuncture points on the bladder and inside the feet, once a day, 3 times a week, for 6 months. After the treatment, his C-AVP-R appeared to be normal, and the nocturnal urine output decreased to 75% ($p<0.01$). Together with the previous studies, it seems possible that somatic warm stimulation by moxibustion in specific points might have facilitated AVP secretion in this patient.

Key words: multiple system atrophy, moxibustion, circadian rhythm, arginin vasopressin, nocturnal polyuria

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Introduction

Traditional alternative medicine has recently attracted attention, because it is regarded as safe and time-tested. Compliance of the medical therapies and drugs is particularly important in neurodegenerative diseases, since patients with such diseases need longstanding care. Among the various alternative medicines available, moxibustion is similar to acupuncture, but involves placing a mini-heap of natural fine fibers ('Moxa' from the dietary herb *Artemisia indica* var. *maximowiczii*, or Yomogi (1)) on the skin and setting fire to it, to create a painless, warm stimulus (Adelta fiber stimulation). Moxibustion and acupuncture have been used particularly in the treatment of chronic pain (2, 3). Experimentally, analgesia and hypothermia induced by electro-acupuncture are associated with an increase in brain opioid, oxytocin, and arginin vasopressin (AVP) (3, 4). These effects are enhanced by electrical stimulation of the hypothalamic paraventricular nucleus (PVN) that contains AVP neurons, but decreased by electrolytical lesion of PVN or by administration of the AVP antagonist (5). Acupuncture also ameliorated sleep in insomniacs, along with an increase in melatonin concentrations at night (6). Therefore, acupuncture or moxibustion might modulate brain hypothalamic function. However, previously, no alternative therapy approach has been made to ameliorate disturbed circadian AVP rhythm (C-AVP-R) in multiple system atrophy (MSA). Here, we report the effects of moxibustion on disturbed C-AVP-R and nocturnal polyuria in a patient with MSA.

Case Report

A 65-year-old man had a 3 year-history of a short-stepped, wide-based gait, followed (2 years before admission) by difficulty in urination. On admission to our hospital, he needed his wife's assistance for walking. He was found to have marked akineto-rigid syndrome with mild cerebellar ataxia. Brain magnetic resonance imaging showed ponto-cerebellar atrophy with a cross sign in the pons and a slit sign in the putamen. He had no postural hypotension, but showed postprandial hypotension. Laryngoscopy revealed laryngeal abductor paresis. He had urinary urgency but could not evacuate his bladder properly. Urodynamic

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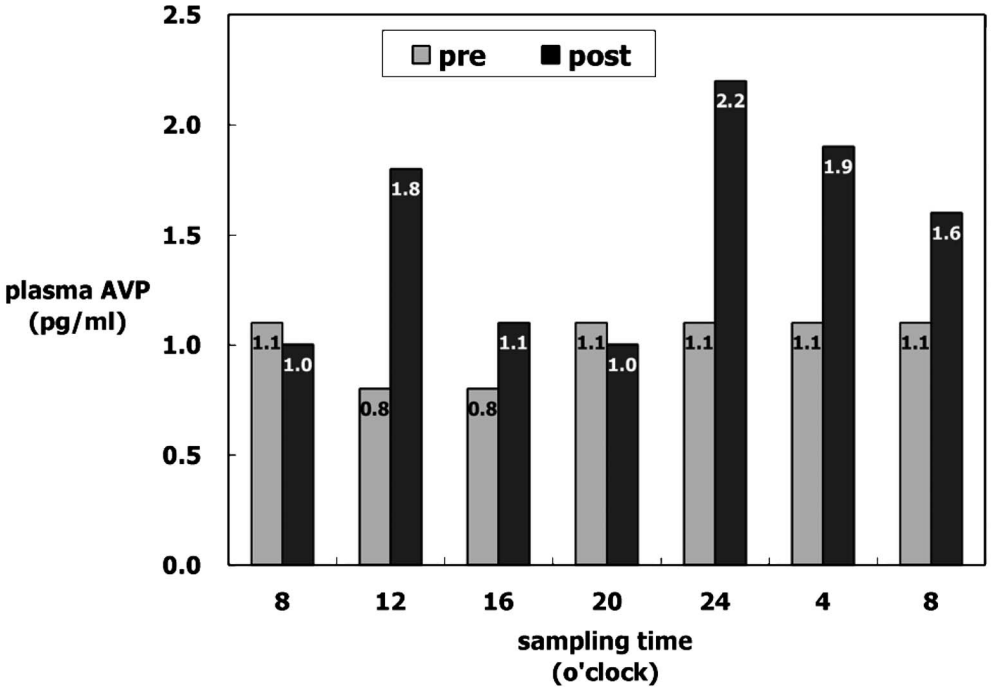

Figure 1. **Circadian arginin vasopressin rhythm before and after moxibustion. Circadian arginin vasopressin (AVP) thythm is depicted. After moxibustion (post), plasma AVP concentration in the nighttime was increased. AVP: arginin vasopressin.**

study revealed detrusor hyperactivity with impaired contractile function, with neurogenic changes in the anal sphincter motor unit potentials. These findings confirmed a diagnosis of MSA—parkinsonian form (MSA-P) (7). In addition, his urine output was 300 ml in the daytime (6-19 o'clock, clean intermittent catheterization [CIC], twice a day) and 2000 ml in the nighttime (19-6 o'clock, Night Balloon, which was placed on him before going to bed and pulled out in the morning, in order to avoid frequent CIC in the nighttime), evidence of extreme nocturnal polyuria, although he had no apparent kidney or heart dysfunction. C-AVP-R in the patient was lost, e.g., plasma AVP concentrations were 0.8 pg/ml in the daytime and 1.1 pg/ml in the nighttime (normal increase in the nighttime: >1.6 (8) (Fig. 1). Since the patient had indicated willingness to undergo alternative therapies, with his informed consent we started to perform moxibustion once a day, three times a week, for 6 months, at three acupuncture meridian points [Ren-3 Zhongji (Middle Pole, Chukyoku); and bilateral St-30 Qichong (Rushing Qi, Okotsu)] on the bladder and at four points [bilateral Sp-6 Sanyinjiao (Three Yin Junction, San-Inko); and bilateral K-5 Shuiquan (Water Spring, Suisen)] inside the feet at the L5 dermatome (Fig. 2) (2), and checked his daily urine output. Moxibustion was started one week before discharge from our hospital, and was continued in the clinic.

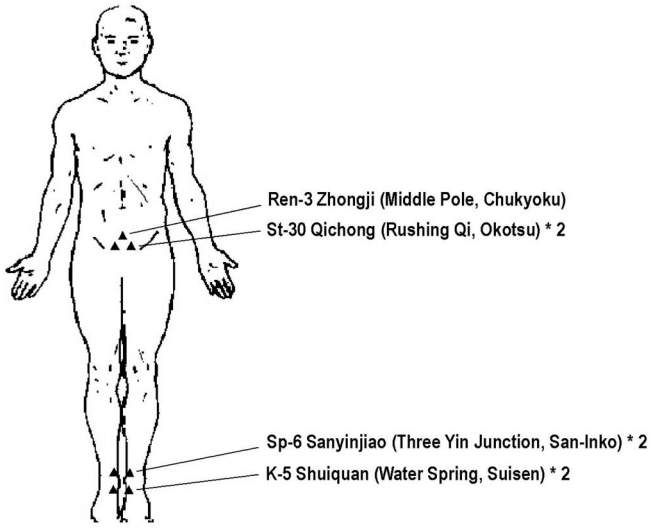

Figure 2. **Points where moxibustion was performed. Moxibustion was performed at three acupuncture meridian points [Ren-3 Zhongji (Chukyoku, Middle Pole); and bilateral St-30 Qichong (Rushing Qi, Okotsu)] on the bladder and four points [bilateral Sp-6 Sanyinjiao (San-Inko, Three Yin Junction); and bilateral K-5 Shuiquan (Suisen, Water Spring)] inside the feet at the L5 dermatome (2).**

Moxibustion caused no pain and was well tolerated by the patient. The urine output ratio during the night in comparison with a whole day was on average 92% in the month before starting moxibustion. Within 2 months after starting moxibustion, the nocturnal urine output ratio gradually decreased to 87% ($p<0.05$) , and it reached 84% ($p<0.01$) at 5 months and 75% ($p<0.01$) at 6 months after initiating moxibustion (Fig. 3). Just after completion of the above program, we measured C-AVP-R again. Plasma AVP concentrations were 1.0 pg/ml in the daytime [in one point (at noon) it reached 1.8 pg/ml] and 2.2 pg/ml in the nighttime; which appeared to be almost normal C-AVP-R (Fig. 1). Along with

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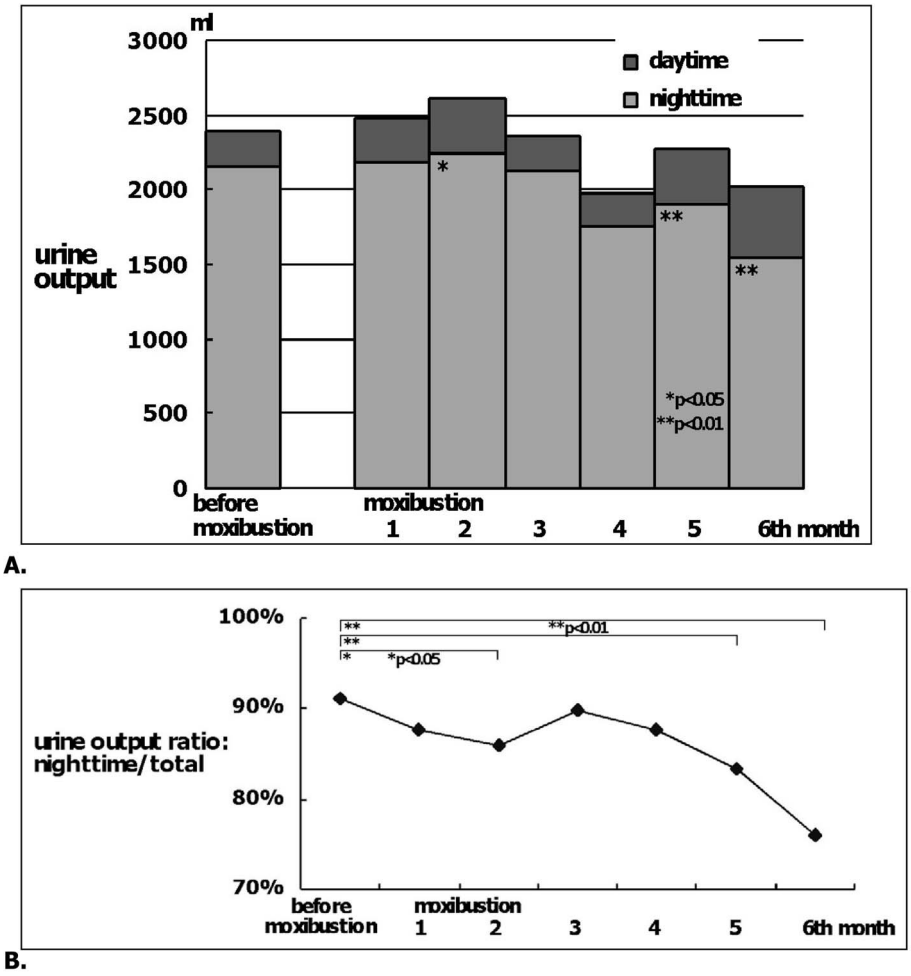

Figure 3. **Urine output ratio before and after moxibustion. Urine output (A) and ratio of nighttime over total (B) are depicted. After moxibustion, the nighttime urine output ratio over the total was significantly decreased.**

the decrease in the nocturnal urine output ratio, the patient's voided volume increased from 0-50 ml before starting moxibustion to 50-150 ml after moxibustion, although the difference did not reach statistical significance. During the observation period, the patient's walking time and other activities in the day time did not change significantly, except for the treatment with moxibustion.

Discussion

MSA is a neurodegenerative disease that affects autonomic (postural syncope/bladder dysfunction) and motor systems (parkinsonian syndrome/cerebellar ataxia), reflecting lesions in the basal ganglia, cerebellum, brainstem, and the spinal intermediolateral cell columns (7). The hypothalamic suprachiasmatic nucleus (SCN), also known as the circadian rhythm center, controls circadian function in the brain including hormonal secretion. AVP (antidiuretic hormone) is a hypothalamic hormone that is produced in the hypothalamic PVN and secreted from the posterior pituitary, which normally rises in the night in order to reduce nocturnal urine output (8). However, in MSA, the SCN is affected (9) and C-AVP-R is lost (9, 10), which causes nocturnal polyuria. Nocturnal polyuria precipitates morning hypotension and results in frequent waking for urination at night, both of which severely affect the quality of life in MSA patients (10, 11).

In the present patient with MSA, moxibustion successfully ameliorated disturbed C-AVP-R and nocturnal polyuria; e.g., before the treatment with moxibustion, plasma AVP concentration stayed stable in a whole day and his nocturnal polyuria was significant (92% of daily urine output, normal<33%), whereas after the treatment, plasma AVP concentration appeared to be increased in the night and nocturnal polyuria was lessened (75%; $p<0.01$). During the observation period, the patient's daytime and nighttime activities did not change significantly, except for the treatment with moxibustion. Therefore, we could attribute amelioration of disturbed C-AVP-R and urine output to be due to moxibustion. In contrast, after moxibustion daytime urine volume increased. This might presumably be brought about as body fluid homeostasis, e.g., compensation mechanism for a nocturnal rise of plasma AVP. Previously, laser acupuncture was as effective as desmopressin in the treatment of primary enuresis in childhood, in which nocturnal polyuria is one of putative mechanisms (12, 13). While the exact

mechanism for improvement in our case is unknown, together with the aforementioned experimental studies, it seems possible that somatic warm stimulation by moxibustion in specific points might have facilitated AVP secretion in this patient. This case report calls for a large study to determine whether moxibustion can treat disturbed C-AVP-R and nocturnal polyuria in patients with MSA.

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