Csf arginine-vasopressin decreases during dehydration in a patient with post-traumatic diabetes insipidus

Csf Arginine-Vasopressin Decreases During Dehydration in a Patient with Post-Traumatic Diabetes Insipidus

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Post-traumatic diabetes insipidus has been reported as a sequela to head injury (*Notman, Mortek* and *Moses* 1980). The complete or partial deficiency of the release of arginine-vasopressin (AVP) into the blood may indicate a lesion of the posterior pituitary. In addition to possible changes in the water metabolism, head injury patients may suffer from post-concussional neurasthenic symptoms, such as irritability, fatigue and difficulties with memory. We describe a patient with persistent post-traumatic diabetes insipidus and persistent post-concussional symptoms.

A 49-year-old, previously physically and mentally healthy, woman suffered a moderate head injury four years ago. The loss of consciousness was less then 30 minutes and the post-traumatic amnesia was less then 60 minutes. She experienced polydipsia and polyuria (4–5 liters per 24 h) within 6 days of the trauma. A water deprivation test at that time provided evidence of a mild cranial diabetes insipidus. Although the diabetes insipidus was treated well with a daily dose of 10 micrograms DDAVP, the patient complained increasingly of the neurasthenic symptoms.

The patient was hospitalized for a clinical evaluation of the post-traumatic symptoms. Routine neurological investigations were carried out, including the collection of csf for standard analysis. In addition, AVP levels in the csf were measured for two reasons. Firstly, since AVP may affect behavioral functions (*Jolles* 1987), besides being involved in controlling water metabolism, AVP levels in the csf were measured in addition to the levels in plasma in order to assess whether AVP levels in the csf were decreased as well as the AVP levels in the blood. Secondly, if the AVP levels in the csf would be decreased, it could be rational to start a memory improving treatment with a vasopressin analogue that is able to pass the blood-brain barrier, such as desglycinamide arginine-vasopressin (DGAVP; see also *Jolles* 1987; *Ang* and *Jenkins* 1982).

AVP levels were measured using a sensitive and specific radioimmunoassay (*ten Haaf, van Wimersma Greidanus, Maigret* and *De Wied* 1986) under conditions of osmotic stimulation. Csf was collected by a repeated lumbar puncture (6 ml csf per puncture): before and 6 hours after dehydration. The medical legacy for performing a double lumbar puncture is based upon the easiness and facilitation by using the former pre-punctured site. Informed consent was obtained before each diagnostic procedure that might cause discomfort.

During a standard dehydration test the urine osmolality remained below 300 mosm/kg. After 8 hours of dehydration, 6 IU of Pitressin were injected i.m. Thereafter, the osmolality of the urine rose further to a final value of 600 mosm/kg. Despite the increasing osmolality of the plasma, the VP levels remained below the normal baseline values (Fig. 1). The levels of AVP in the csf at the beginning and after 6 hours of water deprivation were 2.15 (±0.39) and 0.92 (±0.24) fmol/ml, resp. (normal range: 1.8–2.0 fmol/ml); each sample was assayed in triplicate (means ± SD). T-statistics indicated that the difference cannot be explained by lack of sensitivity or reliability of the assay ($T = 4.69$; $P < 0.001$). Antidiuretic therapy had been discontinued 48 hours before the start of the investigation, as had the use of tobacco and alcohol.

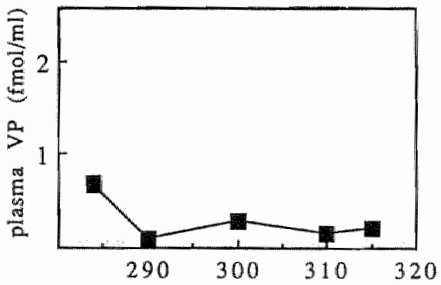

Fig. 1 Arginine-Vasopressin (VP) levels in the blood during water deprivation.

The fact that the AVP concentration in the csf of a patient with central DI was normal or even slightly elevated has been reported by *Luerssen, Shelton* and *Robertson* (1977). Interestingly, the concentration of AVP in the csf decreased significantly in our patient during dehydration. This decrease cannot be biased by a possible dilution induced by a repetitive collection of csf samples, because only 6 ml csf was collected with an interval time of 6 hours before, whereas the half life of AVP in the csf is more than 15 minutes. Moreover, the normal rate of csf formation is about 500 ml per day (*Fishman* 1980; see also *Ang* and *Jenkins* 1982). Although no valid conclusions can be made from only one observation, it might be possible that the capacity to synthesize and/or to store AVP at the neural sites which synthesize AVP for release into the csf is diminished or rapidly exhausted. Whether there is a relationship between central AVP and the behavioral symptoms in this patient remains to be established.

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