An unusual cause of hyponatremia: Ventricular drainage

Sir,

Ventricular drainage is rarely used in pediatric practice. Unfamiliarity with such procedures might result in late recognition of the complications. Therefore, we would like to present a case with hyponatremia due to excessive salt loss after ventricular drainage.

A hydrocephalic ten-month old boy was admitted to the hospital because of a distal end dysfunction of the shunt, a lung infection and malnutrition. The abdominal end of the ventriculo-peritoneal shunt was immediately taken out for free drainage until he was ready for shunt revision. On admission, Na serum of 137 mmol/l was given. Within two days, this was progressively decreased to 125 mmol/l. In spite of five Na replacements, the maintenance of normal serum sodium levels could not be achieved. The boy had neither gastroenteritis nor weight loss.

Other laboratory investigations were as follows: Urine density 1015 (which roughly indicates no water loss - for significant hypovolemia results are expected to be over 1030), plasma osmolality 258 mOsm/l (which shows true hyponatremia and indicates the absence of pseudo-hyponatremia), urine excretion of sodium 8 mmol/l (less than 20 mmol/l indicates renal conservation of sodium and excludes intrinsic renal failure and the inappropriate secretion of antidiuretic hormone syndrome).

The drainage volume of cerebrospinal fluid (CSF) was 300-350 ml/d. CSF sodium was 134 mmol/l. Serum Na concentration spontaneously normalized 24 hours after ventriculo-atrial shunt operation and was maintained between 136-145 mmol/l.

Repeated CSF drainage in the past has been frequently used in premature babies with posthemorrhagic hydrocephalus in order to lower CSF pressure. It has been calculated that 3 mmol Na is lost in each ventricular tap. Therefore, oral salt supplementation has been proposed to prevent the development of hyponatremia.

In another report, two cases with hyponatremia due to excessive CSF loss from ventricular drains have been presented and it was emphasized that normal saline (ml for ml) should be started to replace ongoing losses of CSF when the drain is placed. The relationship between hyponatremia and ventricular drainage has been well demonstrated by Tenbrock, et al. Twelve of sixteen premature babies (or 75%) treated with serial puncture to drain liquor developed hyponatremia. The maximum amount of liquor tapped a day was 3–34 ml (mean 15.6 ml). The resulting daily loss of sodium in the tapped liquor was 0.4–3.7 mmol/kg/day. The extent of hyponatremia significantly correlated with the maximum daily sodium loss in liquor. Besides, premature babies are prone to hyponatremia since their renal salt conservative system is also imperfect.

In the present case, Na loss was 10–11 mmol/kg/day. This can explain why the normalization of serum Na could not be achieved, in spite of the replacement sodium five times. Failure in the correction of hyponatremia was attributed to the fact that the replacement therapy was started after hyponatremia developed. It has been concluded that the development of hyponatremia might most probably have been prevented if the replacement therapy was started at the same time as ventricular drainage.

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