Pituitary cyst presenting with hyponatremia and increased secretion of brain natriuretic peptide

Case report

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Most cases of pituitary cyst are not associated with any clinical symptoms, and the lesions are found incidentally. We report the case of a 60-year-old man with a pituitary cyst causing visual disturbance and hyponatremia. The patient presented with appetite loss and general fatigue. On admission, blood workup showed severe hyponatremia (112 mEq/L), and bitemporal hemianopsia was observed on neurological examination. Magnetic resonance imaging revealed an intra- and suprasellar region cystic mass extending to the frontal base and hypothalamic area. The serum level of brain natriuretic peptide (BNP) was elevated (92 pg/ml) with polyuria and excessive Na excretion. Transsphenoidal surgery was performed to drain the cyst. The cyst wall was partially excised and the cystic fluid was aspirated. The secretion of BNP normalized postoperatively, and the hyponatremia and visual symptoms resolved.

Histological examination, including an electron microscopy study, confirmed the diagnosis of a simple cyst. This appears to be the first reported case of a pituitary simple cyst associated with hyponatremia and an elevated BNP level.

Key Words • pituitary cyst • hyponatremia • brain natriuretic peptide

Abbreviations used in this paper: BNP = brain natriuretic peptide; MR = magnetic resonance.
ing performed 40 days later demonstrated normal response of anterior pituitary hormones (data not shown). The patient has been periodically observed for 40 months at a local hospital. The results of routine laboratory examination have been normal including electrolyte balance. At the last follow-up visit, the patient’s bitemporal hemianopsia, which resolved postoperatively, remained absent, as did the other neurological conditions.

**Histological Examination.** Histological examination showed that the cyst wall was composed of fibrous tissue (Fig. 2) without cilia. There was no sign of cellular dysplasia or malignancy. Normal pituitary tissue was observed adjacent to the cyst wall. Electron microscopy confirmed the absence of cilia and ruled out the possibility of an arachnoidal cyst or adenoma.

**Discussion**

Pituitary cysts are relatively common and most are found incidentally at autopsy. Shanklin⁹ reported an incidence of 13% in a study of 100 consecutive autopsy cases; the patients ranged in age from newborn to 86 years. McGrath⁶ noted an even higher incidence of 33% within the sella and hypophysis in 83 necropsy specimens. Clinically, however, pituitary cysts rarely cause symptoms. Baskin and Wilson¹ reported on 16 patients with sellar “pars intermedia cysts” (diameter 2–3 mm) that caused endocrinological symptoms including menstrual irregularity. There have been no other reports, however, involving symptomatic cases of pituitary cysts. From this standpoint, the simple cyst in the present case is unique because it enlarged enough to extend to the suprasellar region and compress both the optic chiasm and hypothalamus.

The differential diagnosis of hyponatremia includes congestive chronic heart failure, renal dysfunction, and syndrome of inappropriate secretion of antidiuretic hormone. Our patient did not experience any symptoms of heart failure or renal dysfunction. The excess excretion of NaCl ruled out the possibility of syndrome of inappropriate secretion of antidiuretic hormone or a psychogenic origin for the symptoms. It was clear that the elevated BNP level was responsible for the excess renal secretion of NaCl.

There are three types of natriuretic peptide:⁵ atrial natriuretic peptide is produced mainly in the right atrium; BNP is produced mainly in the cardiac ventricles; and C-type natriuretic peptide is released primarily from the vascular endothelium. All three types have strong natriuretic effects and can cause hyponatremia. Although most BNP is known to be secreted from the cardiac ventricles, it was originally identified in extracts of porcine brain. Takahashi and coworkers¹² showed that BNP is produced in the hypothalamus. Recently it has been postulated that salt wasting of central origin induces hyponatremia in patients with aneurysmal hemorrhage as a result of increased secretion of BNP²-⁴,¹¹,¹³ and that subsequently BNP suppresses aldosterone synthesis.² In this context, BNP is hypothesized to be secreted from the hypothalamus, and we consider it likely that this occurred in the present case. The enlarged pituitary cyst that extended to the hypothalamus might have stimulated BNP secretion.

In conclusion, the present case of simple pituitary cyst is unusual because the cyst extended to the hypothalamus and

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* — = not applicable.

![Fig. 1. Preoperative and postoperative MR images.](A: Sagittal T₁-weighted image demonstrating an intra- and suprasellar cystic mass compressing the optic chiasm and the inferior frontal lobe. B: Sagittal T₁-weighted image demonstrating that the mass has signal intensity equal to that of the cerebrospinal fluid. C: Coronal T₂-weighted image revealing that the mass extends to the hypothalamus bilaterally. D: Coronal T₂-weighted image obtained 40 months postoperatively demonstrating complete resolution of hypothalamic compression, although there is still a fluid density in the pituitary fossa.)
caused clinical symptoms. Secretion of BNP from the compressed hypothalamus is also a feature that has not been reported in similar cases.3,4,7,10,13

References

Fig. 2. A: Photomicrograph showing the cyst wall composed of fibrotic tissue. The lumen in the upper part of the panel is the cyst cavity. H & E, original magnification × 20. B–D: Electron micrographs demonstrating the cyst wall and normal pituitary tissue. Adjacent to the wall, there is normal pituitary tissue (D). The cyst wall is composed of basement membrane that is a remnant of necrotic pituitary cells. There are also capillary vessels and pericytes but no cilia are observed. The lesion is considered not to be a tumorous, teratomatous, or inflammatory lesion but rather a simple cyst (B and C). Bars = 20 μm.