



Inappropriate ADH Secretion After Colloid Cyst Surgery; A Possible Situation

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Abstract

We report a case of 71 years 71-year-old man for the surgical management of a third ventricular colloid cyst. the procedure consisted of a transfrontal transventricular resection, with a good postoperative status. After his discharge, the patient consulted for headaches and confusion. Biological investigations revealed hyponatremia that was managed finally with a fluid restriction protocol, and the diagnosis of an inappropriate ADH secretion was retained. the specific parameter of this case is the occurrence of this syndrome after an unusual colloid cyst surgery using a transventricular approach.

Keywords: *ADH, Hyponatremia, colloid cyst.*

Introduction

The third ventricle is located deep within the diencephalic region, with a close relationship to several important structures as; the hypothalamus, the thalami, the fornices, and corpus callosum. Third ventricular tumors are rare and accounting only 0.6 to 0.9% of the other neoplasms that affect the brain (1). The most common tumor is a colloid cyst, which is a benign cyst often located adjacent to the foramen of monro causing occasionally uni or biventricular hydrocephalus. They represent 2% of all ventricular tumors (2). Although colloid cysts are benign brain tumors their treatment modalities and techniques are still controversial (3).

Several risks and complications were associated with the surgery of third ventricular tumors. Authors reported; seizures related to the transcortical approach, and short –term memory loss from fornix manipulation during the dissection around the interventricular foramen (4) . Hypothalamic disorders were also reported in 0.9% of cases after endoscopic third ventriculocisternostomy (5).

The syndrome of inappropriate antidiuresis (SIAD) is a condition where the antidiuretic hormone is released without regulation in the blood. it's considered to be the most common cause of hypotonic hyponatremia (6). This condition of hyponatremia is reported to affect 15 to 30% of patients in hospitals(7). For the first time to our knowledge, we report on the case of a patient who underwent a microsurgical resection of a colloid cyst through a transfrontal approach and presented 5 days postoperatively a hyponatremia that was managed as an SIAD.

Case Presentation

A 71 year old man with a history of hyper blood pressure well controlled with angiotensine inhibitor and a thiazide diuretic . He was mainly complaining for several weeks of intermittent headaches. These symptoms were followed by several episodes of vomiting and gait disturbances.

During his admission, he was awake, without major deficit However, we noticed slight recent memory disorders, otherwise he didn't present a motor deficit in his four limbs. Considering his history of raised intracranial pressure, we have performed an eye fundus that was normal as well as the rest of the ophthalmological evaluation .A brain CT scan showed an isodense lesion, in the midline close to Monroe's foramina There was a passive ventriculomegaly. In the MRI, the cyst appeared to be isointense in T1 sequences and hyperintense in T2. The anterior insertion of the cyst was close to the foramen of Monro. There was a passive hydrocephalus. (Figure 1).

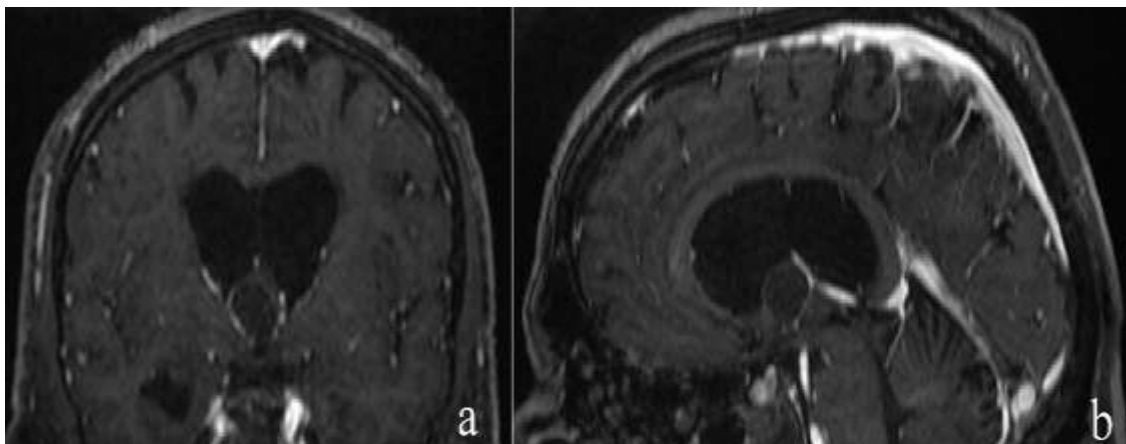


Figure 1: Preoperative MRI: a- coronal T1 + contrast showing an isointense cyst projecting through the foramen of Monro with the venous system dropped over the edges of the cyst. b- sagittal T1 + contrast showing the position of the cyst and the interventricular foramina and the internal cerebral vein. a ventriculomegaly could be noticed favoring our transventricular approach.

He underwent a trans frontal trans ventricular approach, the resection of the colloid cyst was performed through the foramen of Monro with usual microsurgical technics. The postoperative course was uneventful, and the patient was discharged 3 days after surgery in a good clinical status.

Unfortunately, two days after he consulted the emergency room. He was confused and drowsy. He had a fever without symptoms of meningitis. The MRI showed a good tumoral resection without any features of complications. (Figure 2)

However, the biological evaluation revealed a severe hyponatremia at 118mEq/L. The rest of the investigations revealed a urinary tract infection that was managed with a targeted antibiotherapy. At the initial stage of management, we started the biological correction, but we didn't achieve satisfying results. we have performed than a complete hypophysiogram that didn't reveal specific disorders with normal functions of all the endocrine system axes. Further evaluations didn't reveal kidney or liver dysfunctions and we didn't notice clinical evidence of volume depletion.

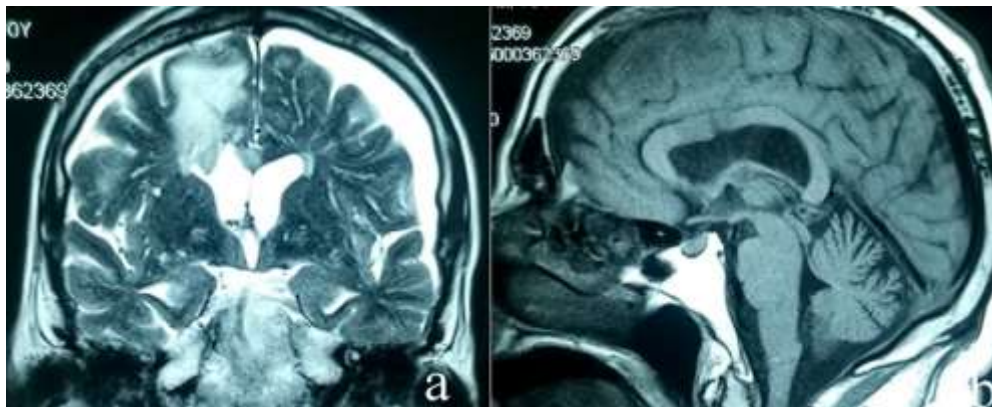


Figure 2: Postoperative MRI: a; T2 coronal showing a total resection and liberation of the flow through the interventricular foramina. we can notice postoperative frontal edema without signal abnormalities of the hypothalamus.b- sagittal T1 showing the good status of the structures around the third ventricle without features of complication

The urine sodium level was ; 163.8 mEq/L (greater than 40 mEq/L), urine osmolality : 220 mOsmol/Kg.(greater than 100 mOsm/kg) .Considering these results, we have retained the diagnosis of a SIAD . we have conducted a specific scheme of fluid restriction with daily sodium levels evaluations. The fluid restriction was limited to 800 cc/24 hours.

We have maintained the restriction for 10 days and a significant improvement in the clinical status and the biological parameters was noticed. The sodium level was at 134 mEq/L before his discharge. The patient presented a better clinical status during his regular further follow-up.

Discussion

Third ventricular colloid cysts are benign tumors that are located close to critical structures such as the fornices, internal cerebral veins, and thalami. They are mainly revealed by headaches in 83% of the cases and Drop attacks in 8% (8). In the same report, the authors used a microscopic interhemispheric technique and noticed complications; supplementary motor area syndrome, memory disturbance, hemiplegia, and even seizures (8).

In another interesting work, they compared open and endoscopic approaches. The authors concluded that the endoscopic modality was associated with reduced operative time, length of stay in the hospital, and lower complication rates (9). Among these complications, we can notice; memory dysfunctions, seizures, and infections that were mainly related to microsurgical approaches. In reviewing more than 250 surgeries of colloid cysts resected through the transcranial route, the authors reported almost the same complications as motor deficit, and meningitis (10). One work evaluated precisely the complications related to the transcallosal transforaminal route to the colloid cyst and reported acute hydrocephalus, mutism, and subdural hematoma (11).

Hyponatremia is relatively frequent in hospitalized patients. Several percentages were reported from large studies, where ranges were between 5.5% to 28.8%. This condition was defined by serum Sodium levels lower than 135 mmol/L (12-14). Many researchers isolated this biological condition from trans locational hyponatremia induced by increased serum glucose or pseudo hyponatremia associated with serum lipids or proteins (15, 16).

In some reports, age was considered a strong factor for hyponatremia in hospitalized patients (17). Our patient was a 71 years old man, relatively younger than the age limit mentioned in the previous work. One of the most frequent etiology of hyponatremia is SIAD, representing close to 40 % of cases (15). This pathological condition was defined as a water balance disorder in the body affecting its excretion. The secretion of the ADH is suppressed in similar conditions and elevated water intake generates the hyponatremia. One large international study investigated the causes of SIAD and reported that the origin was undetermined in 35.2 % , induced by drugs in 17.8%, associated with pulmonary disease in 10.7% of cases, and related to some bacterial infection in 19% (18).

SIAD was previously reported to be a following event after pituitary surgery, and some protocols were elaborated to prevent these conditions with satisfying results. The patient's BMI was also considered in its occurrence in some situations (19, 20).

In our report, this serious condition was noticed after a third colloid cyst surgery. The microsurgical steps were usual. we have reached the right lateral ventricle using a corticotomy through the frontal cortex (F2). After identifying all the venous elements and choroid plexus, the foramen of Monro was identified and was filled with a cyst, that was first aspirated. The content was viscous and the cyst was dissected considering critical structure as the fornix and the internal cerebral veins. A small remnant of the cyst was coagulated at the end of the surgery.

The occurrence of hyponatremia after colloid cyst surgery is exceptional if not unique, without similar reports in the limits of our research. Hyponatremia was defined by serum levels of Sodium $< 135\text{mEq/L}$ and it was considered one of a medical emergency. It's revealed by several symptoms such as nausea, vomiting, confusion, and headaches and could be a life-threatening condition (21). One prospective study of patients with severe postoperative hyponatremia and seizures revealed that 27% of them died, 13% had paralysis and the rest of them stayed in a vegetative condition (22). Our patient presented confusion which is concomitant with the literature and his biological evaluation was also concluded to a hyponatremia. After eliminating all the other diagnoses of hyponatremia, and considering the results of biological studies, the SIAD was retained as an etiology for this postoperative hyponatremia. This was further proved by the improvement of the clinical status after fluid restriction. The volume of fluid intake of the patient during this situation ranged between 500 to 1000 ml as was mentioned in one study (23). fluid restriction was capitalized during the management of our case, however, this attitude could be ineffective. this was observed in a large international registry of more than 1500 patients with SIAD, with a mean Sodium level of 124 mmol/L. more than half (50%) of patients did not improve after fluid restriction (24). our patient had an 800ml intake of fluid per day during a period of 10 days.

To our knowledge, this is the first case of SIAD reported after the microsurgical, transcortical surgery for the resection of a third ventricular colloid cyst. SIAD is one of the scenarios after pituitary surgery and even some guidelines were conceived to prevent the induced hyponatremia (25, 26).

This is the main specific parameter of our case. The etiologies that could be raised in the occurrence of this condition are first; some irritation of the hypothalamus during dissection probably that generated such biological disturbances. We didn't notice hypothalamic symptoms after surgery and the postoperative MRI

didn't demonstrate ischemic lesions of this region. Several etiologies were considered in the process generating this condition; malignancies, drugs, pain, nausea, central nervous system disorders, and pulmonary infection (27). When our patient consulted, the investigation revealed a urinary tract infection that was successfully managed using adapted antibiotics.

Conclusion

Hyponatremia is a relatively frequent and serious biological disorder, encountered mainly in old and admitted-to-hospital patients. The diagnosis of exclusion of SIAD is made after a deep investigation of all other possible etiologies of hyponatremia and a clear improvement after fluid restriction. This condition follows classically a pituitary surgery, but in our case was about a third ventricular colloid cyst resected using a transcortical technique which is unusual. A fluid restriction with electrolyte level control could be suitable after cranial surgeries to prevent similar situations and guarantee a safe discouragement of the patient.

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