CASE REPORT

Syndrome of inappropriate antidiuretic hormone secretion after functional endoscopic sinus surgery

Cezar Octavian Morosanu1,2, Keng Siang Lee3,*, Fatemeh Keshtkar1 and Claire Langton-Hewer1

1Department of Otolaryngology and Head & Neck Surgery, University Hospitals Bristol, Bristol, UK, 2Human Anatomy Resource Centre, University of Liverpool, Liverpool, UK and 3Bristol Medical School, Faculty of Health Sciences, University of Bristol, Bristol, UK

*Correspondence address. Bristol Medical School, Faculty of Health Sciences, University of Bristol, Bristol BS8 1UD, UK. E-mail: kl17746@bristol.ac.uk

Abstract

Functional endoscopic sinus surgery (FESS) is effective in cases of sinusitis where pharmacological treatment has not been successful. Patients undergoing FESS have reported an 85% improvement in symptoms as measured by the quality of life scores. Despite its convincing therapeutic benefit, complications sometimes occur with potentially dire consequences. We report the case of a 69-year-old patient who underwent FESS for recurrent frontal sinusitis and developed a syndrome of inappropriate antidiuretic hormone secretion (SIADH) on Day 3 post-operatively. To our knowledge, this is the first documented case of SIADH arising after an endoscopic intervention for frontal sinusitis.

INTRODUCTION

Functional endoscopic sinus surgery (FESS) is used to treat sinusitis where pharmacological treatment has not been successful. Despite being perceived as a relatively safe procedure, FESS has been reported to have a complication rate varying from 0.36 to 3.1% [1, 2]. Frontal sinusitis can have severe complications [3], although surgical treatment is not without its own risk. Here, we describe syndrome of inappropriate antidiuretic hormone secretion (SIADH) resulting from an endoscopic intervention for frontal sinusitis.

CASE PRESENTATION

A 69-year-old female patient presented with a significant headache after undergoing a FESS intervention 3 days prior to admission. She had a previous medical history of Type 2 diabetes mellitus, gastric reflux, epiphora, allergic rhinitis and chronic sinusitis for which she had undergone multiple FESS procedures. Her regular medication included insulin, saxagliptin, metformin, fexofenadine, ezetimibe, fluvastatin and lansoprazole and she was allergic to tetracycline antibiotics. The patient was well after the surgery. Her pain was adequately managed with paracetamol and codeine and she was discharged the next day. However, her minor headache worsened over the following days. She subsequently developed nausea, vomiting and photophobia, which eventually led the patient to present to the emergency department with suspected meningitis.

INVESTIGATIONS

Computed tomography (CT) of the head revealed no signs of meningeal or intracerebral enhancement to suggest an intracranial abscess or cerebritis (Fig. 1).
In many cases, the cause of hyponatraemia is essentially a diagnosis of exclusion and cannot be differentiated clinically between CSW and SIADH: patients with CSW display hyponatraemia in association with the clinical and biochemical features of hypovolaemia with marked natriuresis and diuresis. Patients with SIADH display clinical features of euvoelaemia and biochemical findings of dilutional hyponatraemia. This distinction is vital because the management of the two conditions is significantly different.

Once the diagnosis of SIADH was established, the main goal was to investigate causes that could have generated the electrolyte imbalance. Any central nervous system disorder, such as meningocencephalitis, cerebral tumours, cavernous sinus thrombosis, hydrocephalus, multiple sclerosis, subarachnoid haemorrhage or head trauma, was excluded by the CT head scan. Pulmonary conditions, such as bronchogenic small cell carcinoma, pneumonia, tuberculosis, abscess and aspergillosis, were considered but were ruled out by a clear chest X-ray. As the patient had mild abdominal discomfort, upper gastrointestinal endoscopy and abdominal US were performed, and we excluded any gastrointestinal carcinoma. Potential endocrine issues, such as adrenal insufficiency and hypothyroidism, were part of the differential diagnosis but were excluded after a positive short Synacthen and findings of normokalaemia and normal thyroid function tests. The patient’s regular medication did not have any drugs that stimulate ADH release or potentiate its actions, or ADH analogues [4]. However, the small dose lansoprazole she was taking for her gastroesophageal reflux may have contributed to her hyponatraemia. Vomiting is a symptom of severe hyponatraemia and it is likely that these episodes also had a role in further aggravating her sodium levels through dehydration. Another potential contributing factor could have been the analgesic medication given post-operatively. Hereditary causes were excluded from her medical history. She had no history of pituitary surgery, but the small haemorrhage in her sphenoid sinus, visible on the CT imaging, should have caused an imbalance in the function of her neurohypophysis.

**TREATMENT, OUTCOME AND FOLLOW-UP**

The patient was put on a strict fluid restriction of 1500 ml/day for 3 days. No improvement was noted with this regimen, so the restriction was tightened to 750 ml/day for an additional 6 days. In addition, lansoprazole was also stopped on Day 7 as it may have potentiated the hyponatraemia. Over the next week, her hyponatraemia steadily and significantly improved and the patient was safely discharged. All electrolytes were in range on her follow-up 16 days post-FESS (Table 1). No further follow-up was required.

**DISCUSSION**

Endocrine disorders are a rare consequence of sinus pathology and are even rarer post-sinus surgery [5]. Another case of SIADH has also been reported in a 33-year-old male patient who underwent sinus surgery for a sphenoid sinusitis [6]. The
cause for this clinical entity was assumed to be the surgical stress to the pituitary gland due to the perforation of the base of the sellar region [6]. Different reports describe SIADH as the initial presentation of isolated esthesioneuroblastomas in the maxillary sinus [7–10].

In our case, the endoscopic surgery to the frontal sinus triggered an endocrine imbalance almost immediately after surgery. It was considered that SIADH originated in the insult to the pituitary gland as a consequence of surgical stress, similar to the case by Takeda et al.; however, there are clear indications that factors, such as the lansoprazole treatment and her episodes of vomiting, could have contributed to her low sodium [6]. SIADH is a known complication of endoscopic transnasal, transsphenoid interventions for pituitary masses due to the above mechanism [11]. An indication for this process in our case was the small degree of bleeding evident in the sphenoid sinus. Equally, it should be emphasized that there is a high possibility that the sinus surgery was just a contributing factor in this patient and that SIADH was in fact caused by the lansoprazole treatment [12]. Interestingly, Falhammar et al. revealed that there is no association between hyponatraemia and the newly started and ongoing lansoprazole treatment [13].

CONCLUSIONS
We report an unusual case of severe hyponatraemia associated with FESS, although the exact pathophysiology of SIADH induced in our patient remains unclear. Nevertheless, it is important for physicians to investigate the underlying cause of refractory or recurrent hyponatraemia, as it can be a marker of underlying disease.

CONFLICT OF INTEREST STATEMENT
None declared.

FUNDING
Funding to pay the Open Access publication charges for this article was provided by the University of Bristol (to Keng Siang Lee).

REFERENCES
1. Krings JG, Kallogjeri D, Wineland A, Nepple KG, Piccirillo JF, Getz AE. Complications of primary and revision functional endoscopic sinus surgery for chronic rhinosinusitis. Laryngoscope 2014;124:838–45.
2. Stankiewicz JA, Lal D, Connor M, Welch K. Complications in endoscopic sinus surgery for chronic rhinosinusitis: a 25-year experience. Laryngoscope 2011;121:2684–701.
3. Goldberg AN, Oroszlan G, Anderson TD. Complications of fronto-sinusitis and their management. Otolaryngol Clin North Am 2001;34:211–25.
4. Ellison DH, Berl T. Clinical practice. The syndrome of inappropriate antidiuresis. N Engl J Med 2007;356:2064–72.
5. Wang H, Jiang W, Xu C, Qiu X. Systemic complications of functional endoscopic sinus surgery in patients with chronic rhinosinusitis. Lin Chung Er Bi Yan Hou Tou Jing Wai Ke Za Zhi 2014;28:1569–72.
6. Takeda A, Yatomi M, Ogawa Y, Nomoto M, Katsube Y, Iwasawa, et al. A case of syndrome of inappropriate antidiuresis. N Engl J Med 2014;370:2064–72.
7. Rasool A, Dadgostar A, Manji J, Al-Asousi F, Javer A. Esthesioneuroblastoma isolated to the maxillary sinus presenting as SIADH. Case Report OTO Open 2018;2:2473974X18792488.
8. Wong E, Choroomi S, Palme CE, Singh NP. Isolated primary maxillary sinus esthesioneuroblastoma presenting as idiopathic syndrome of inappropriate antidiuretic hormone. BMJ Case Rep 2019;28:e228666.
9. Plasencia YL, Cortés MB, Arencibia DM. Esthesioneuroblastoma recurrence presenting as a syndrome of inappropriate antidiuretic hormone secretion. Head Neck 2006;28:1142–6.
10. Senchak A, Freeman J, Ruhl D, Senchak J, Klem C. Low-grade esthesioneuroblastoma presenting as SIADH: a review of atypical manifestations. Case Rep Otolaryngol 2012;2012:582180.
11. Janneck M, Burkhardt T, Rotermund R, Sauer N, Flitsch J, Aberle J. Hyponatremia after trans-sphenoidal surgery. Minerva Endocrinol 2014;39:27–31.
12. Fort E. Lansoprazole-induced hyponatremia. Gastroenterol Clin Bio 2000;24:686.
13. Falhammar H, Lindh JD, Calissendorff J, Skov J, Nathanson D, Mannheimer B. Associations of proton pump inhibitors and hospitalization due to hyponatremia: a population–based case–control study. Eur J Intern Med 2019;59:65–9.

Table 1. Investigation results

| Investigation | Post-FESS day 1 | Post-FESS day 2 | Post-FESS day 3 | Post-FESS day 4 | Post-FESS day 5 | Post-FESS day 6 | Post-FESS day 7 | Post-FESS day 8 | Post-FESS day 9 | Post-FESS day 10 | Post-FESS day 11 | Post-FESS day 12 | Post-FESS day 13 | Post-FESS day 14 | Post-FESS day 15 | Post-FESS day 16 |
|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Serum sodium (mmol/l); normal range: 133–146 | 122 | 123 | 122 | 118 | 121 | 123 | 128 | 133 | 135 | 137 | | | | | |
| Serum potassium (mmol/l); normal range: 3.5–5.3 | 4.2 | 4.8 | 4.2 | 4.1 | 4.2 | 4.2 | 4.5 | 4.2 | 4.7 | 4.7 | | | | | | |
| Urea (mmol/l); normal range: 2.5–7.8 | 2.5 | 3.9 | 4.9 | 3.0 | 2.8 | 3.9 | 3.4 | 3.3 | 3.4 | 3.4 | | | | | | |
| Creatinine (μmol/l); normal range: 45–84 | 42 | 55 | 47 | 46 | 57 | 57 | 55 | 62 | 55 | 56 | | | | | | |