Case Report

# Navigating the Complexities of Diabetes Insipidus Worsened by Primary Polydipsia: A Case Report

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## Abstract

**Background:** Fluid-electrolyte balance is regulated within a narrow range in diabetes insipidus (DI). Coexisting Primary Polydipsia and the related phenomenon of hyponatremia cause considerable mortality and morbidity.
**Cases Report:** A 70-year-old woman with a history of central diabetes insipidus was referred to our center with a provisional diagnosis of acute-onset hyponatremia due to increased usage of DDAVP spray, who was admitted and treated carefully. According to daily monitoring of electrolytes and urine output, switching from spray to nightly melt DDAVP administration, the patient continued to display symptoms of polyuria, polydipsia, and low sodium levels. It led to a psychiatric consultation due to suspicion of accompanying Primary Polydipsia after experiencing a stressful event.
Prescription of anti-anxiety and sedative medications showed successful resolution of hyponatremia, highlighting the importance of personalized strategies in managing the multifactorial aspects of DI and PP.
**Conclusion:** This case underscores the complexities and potential remedies for handling DI in patients with underlying psychiatric conditions, emphasizing the necessity of a collaborative approach to optimize patient outcomes.

**Keywords:** Diabetes Insipidus, Primary Polydipsia, Fluid Electrolyte Balance

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## Introduction

Diabetes insipidus (DI), an infrequent endocrine disorder that affects approximately 0.004% of the global population, presents notable challenges in the realm of medical education and research due to its rarity[1]. This disorder, which does not show a gender preference, can manifest at any age, with hereditary forms typically appearing earlier. DI can be classified into four distinct categories, namely central, nephrogenic, dipsogenic, and gestational[2]. Primary polydipsia (PP) is a condition characterized by excessive consumption of fluids, resulting in polyuria with diluted urine and ultimately leading to

hyponatremia. PP can be divided into two types: psychogenic polydipsia (PPD) and dipsogenic polydipsia. PPD is a disorder that is associated with significant morbidity and mortality, particularly prevalent among psychiatric patients, occurring in 6% to 20% of cases, and being more prevalent in individuals with schizophrenia and middle-aged women with anxiety disorders[3,4]. The impact of DI on quality of life can vary greatly depending on the underlying cause and the treatment provided. Despite advancements in the identification of different types and causes of DI, the diversity, severity, and genetic basis of the disorder mean that a universally effective treatment does not currently exist[5]. In a relevant case, we will present the management of a 70-year-old woman with central and idiopathic diabetes insipidus, who was treated with Desmopressin (DDAVP spray) and experienced an exacerbation of symptoms.

## Case Report

A 70-year-old woman patient, who is known to have a medical history that includes idiopathic central diabetes insipidus, has been consistently managed with Desmopressin (DDAVP spray) every night for several years while maintaining regular follow-up. In addition, the patient's medical records show that she has been diagnosed with Prediabetes mellitus, hypertension, and dyslipidemia, for which she receives treatment with Rosuvastatin, Aspirin, and Valsartan; also, she did not have any psychiatric disorders. When she presented to the emergency room, her companions reported that the previous week had been marked by a stressful event dealing with a car accident. The heightened stress levels appeared to exacerbate the patient's symptoms of polyuria and polydipsia. As a result, her usage of Desmopressin spray increased many times during the day, leading to a decline in her level of consciousness. Consequently, the patient was referred to our center with a provisional diagnosis of hyponatremia. During the initial examination, the patient was confused but responded accurately to questions. She showed signs of anxiety, neurological assessments showed no abnormalities, and her vital signs remained stable. Examination of her heart, lungs, and abdomen revealed normal findings. Given the patient's history and the suspicion of an overdose of Desmopressin, a comprehensive set of tests was conducted at our center, and the results are detailed in Table 1.

Based on the analysis of the test results and initial examination, the onset of acute hyponatremia has been attributed to an excessive amount of DDAVP spray. It is plausible that the patient did not experience the expected response to the nasal spray recently, leading to increased use.

At the same time, it is crucial to consider other potential factors that may worsen the underlying condition and contribute to hyponatremia. Given the diagnosis and dry mucous membranes, the patient's DDAVP spray was discontinued. Stringent checks were implemented for input and output, and sodium and potassium levels were assessed every two hours. Simultaneously, normal saline with 5% hypertonic sodium was initiated. Continuous monitoring of the patient's vital signs was diligently maintained. With vigilant monitoring and a subsequent increase in sodium levels to 136, symptoms resembling those of diabetes insipidus gradually appeared, indicating the patient's underlying condition. The patient's overall condition improved, and full consciousness was regained. As the sodium level exceeded 140 and the urinary specific gravity reached 1.007, the DDAVP spray was reintroduced.

**Table 1.** Paraclinical findings of the patients on admission**.**

| Variable | Value | Variable | Value |
|---|---|---|---|
| **Plasma sodium** | 120mg/dl(135-145) | Urine sodium | 66 |
| **Plasma potassium** | 4 mg/dl(3.5-5) | Urine SG | 1028 |
| **Serum creatinine** | 1.2 mg/dl | Vitamin D | 28ng/ml |
| **Serum calcium** | 11 mg/dl(8.5-10.5) | PTH | 73pg/ml |
| **Serum phosphorus** | 4.5 mg/dl(2.5-4.5) | ACE | 30(NL<60) |

Methods (Differential Diagnosis, Investigations, and Treatment)

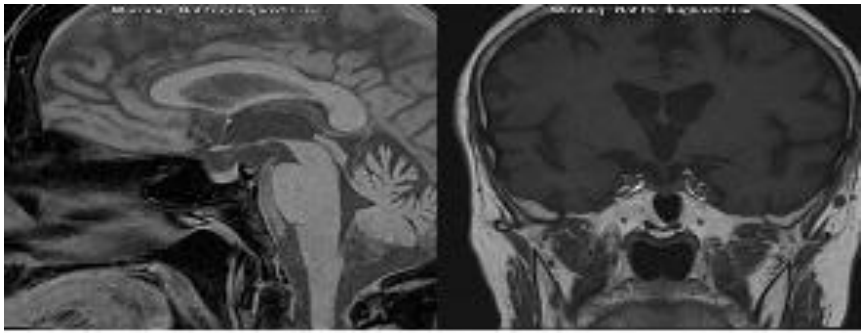

**Figure 1.** Sagittal and coronal view of the pituitary MRI: normal sellar region and absence of bright spot.

Additionally, due to suspicions of resistance to the DDAVP spray, the patient was concurrently prescribed DDAVP MELT at a dosage of 120 micrograms every night. Continuous patient monitoring was conducted during this phase. In light of the positive findings in the patient's urine test, including white and red blood cells, and a confirmed elevated C-reactive protein (CRP) level, a course of treatment for possible coexisting urinary tract infection (UTI) was initiated. Additionally, an ultrasound of the kidney and urinary tract was requested, yielding expected results. They sought consultation with the gynecology service to investigate and rule out potential diagnoses, such as cystocele caused by frequent urination. To determine the underlying cause of central DI, they performed a pituitary MRI, focusing on the anterior pituitary axis. The pituitary axis tests came back normal, but the MRI showed no bright spot on the sagittal T1 view (Figure 1). Due to elevated levels of calcium and phosphorus in the patient's tests, initial suspicions pointed toward a potential vitamin D overdose. As a result, they requested assessments of the patient's vitamin D and serum parathyroid hormone (PTH) levels, both of which were normal. Further investigation considered sarcoidosis as a potential cause; therefore, the patient underwent ACE-level testing and a lung CT scan. The ACE levels were within the normal range, and no adenopathy was observed in the patient's lung CT.

Additionally, the patient's 24-hour urine calcium was reported as usual. Based on examinations and imaging, the rheumatology service suggested a diagnosis limited to osteoarthritis for the patient, and calcium and phosphorus levels returned to normal after 24 hours of hydration. However, throughout the hospitalization period with daily monitoring, the patient continued to display symptoms of polyuria, polydipsia, and low sodium levels, even with nightly administration of DDAVP MELT120 micrograms. It is important to note that the frequency of these symptoms did not match the typical patterns of diabetes insipidus. As a result, suspicions arose that the patient may be experiencing primary polydipsia following a stressful incident. This led to the additional diagnosis of primary polydipsia alongside the primary condition of DI. The patient's sodium levels remained in the low normal range due to the presence of both psychiatric and medical conditions. Despite treatment with DDAVP MELT, the patient's sodium levels did not improve significantly. As a result, a psychiatric consultation was requested. The consultation led to the prescription of anti-anxiety and sedative medications, such as Melatonin, Buspirone, and Propranolol.

**Outcome and Follow-Up**

After two weeks of psychiatric consultation, the patient's anxiety symptoms started to decrease gradually. There was also some improvement in primary polydipsia. The patient's sodium levels returned to normal, and the prescribed medications and DDAVP MELT effectively controlled her symptoms. Due to the favorable progress, the patient was discharged from the hospital in good overall condition. A one-month follow-up confirmed that the disease was under control.

## Discussion

This study delved into an older woman who is seventy years old and has idiopathic central diabetes insipidus (DI). The patient's symptoms worsened after a distressing incident. The patient's increased usage of Desmopressin resulted in hyponatremia and a change in

consciousness, which prompted further examination and treatment. A study that retrospectively reviewed 147 patients with chronic central DI reported hyponatremia as a significant complication of Desmopressin therapy with long-term follow-up[6]. Chronic mild hyponatremia is linked to an unsteady gait, falls, fractures, and higher mortality. Therefore, it is crucial to maintain normal plasma sodium levels[7]. In this unusual case, where primary polydipsia and central DI coexist, a precise approach is necessary to provide a comprehensive analysis. Primary polydipsia (PP), which is a secondary form of polyuria, involves excessive consumption of large quantities of fluids that result in polyuria while the AVP secretion remains intact. Studies indicate that only half of PP patients experience intermittent hyponatremia, which is more likely to occur after the acute ingestion of a large amount of fluid[8]. Simultaneously experiencing PP and diabetes insipidus can present a formidable challenge in terms of management due to the considerable fluctuations in sodium levels caused by changes in water consumption. The recommended course of action for PP entails regulating water intake; however, this approach poses a challenge in terms of compliance, particularly among individuals with psychogenic polydipsia characterized by compulsive behavior. Various categories of medication have been studied, yet none have proven efficacious. Furthermore, behavioral treatment trials have yielded mixed results[9]. In 2006, a systematic review of the Cochrane database identified two clinical trials deemed suitable for analysis.

This review examined randomized trials that encompassed patients with psychiatric disorders and psychogenic polydipsia, assessed pharmaceutical interventions, and analyzed significant outcomes[10]. A standardized, proven treatment for primary polydipsia has not been established. Ideally, the management of this condition involves water restriction; however, adherence to this strategy poses significant concerns due to the compulsive nature of water-drinking behavior in individuals with psychogenic polydipsia. To achieve better results, it is possible to educate health-conscious individuals who exhibit polydipsia and consciously reduce their water consumption. Costanzo et al. documented the presence of chronic polydipsia in a patient with psychiatric disorders and diabetes, which is relevant to our case[11]. Both cases present the challenge of effectively managing polydipsia, which is a symptom commonly observed in patients with psychiatric disorders and diabetes insipidus. In the treatment of this patient, we employed conventional methods, such as the utilization of beta-blockers[12,13] and Buspirone, to address the significant anxiety that was experienced. Buspirone has been utilized for the treatment of anxiety disorders, including generalized anxiety disorder (GAD), as well as for alleviating symptoms of anxiety. Furthermore, investigations have been conducted regarding the potential use of Buspirone in combination with melatonin for the management of depression and cognitive impairment through the promotion of neurogenesis[14].

## Conclusion

This particular case report draws attention to the multifaceted nature of diabetes insipidus, providing unique insights into the intricate interplay between stress, medication usage, and physiological responses. These unforeseen discoveries underscore the need for a nuanced, personalized approach to the management of diabetes insipidus, shedding light on the various factors that may impact treatment outcomes and suggesting potential avenues for future research to refine therapeutic strategies. Our case provides significant knowledge regarding the difficulties and possible remedies for effectively handling DI in individuals who have psychiatric disorders, emphasizing the requirement for a thorough and cooperative strategy to enhance the outcomes of the patients.

## Conflict of Interest

The authors declare no conflicts of interest.

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