DIENCEPHALIC ENCEPHALOPATHY WITH OPTIC SHEATH ENHANCEMENT AND SEVERE HYPERNATREMIA: A DIAGNOSTIC DILEMMA BETWEEN WERNICKE'S ENCEPHALOPATHY AND ATYPICAL NMOSD

Dr. Naman Singh[1], **Dr. Anuja Gupta**[1], **Dr. Ami Ruparelia**[1], **Dr. Ashok Kumar Dash**[1*]

[1*]Department of General Medicine, Sharda University, Greater Noida, Uttar Pradesh, India

[1]Junior Resident (Dr. Naman Singh, Dr. Anuja Gupta, Dr. Ami Ruparelia) | Email: drnaman22singh@gmail.com | Email: anujavinodgupta20@gmail.com | Email: ami.ruparelia98@gmail.com

[1*]Professor (Dr. Ashok Kumar Dash) | Email: drashokkumar.dash@gmail.com

***Corresponding Author:** Dr. Ashok Kumar Dash, Professor, Department of General Medicine, Sharda University, Greater Noida, Uttar Pradesh, India | Email: drashokkumar.dash@gmail.com

A B S T R A C T

Background: Symmetrical involvement of diencephalic and brainstem structures presenting with altered sensorium presents a complex diagnostic challenge. Differentiating metabolic encephalopathies, such as non-alcoholic Wernicke's Encephalopathy (WE), from demyelinating/autoimmune conditions like Neuromyelitis Optica Spectrum Disorder (NMOSD) requires close synthesis of clinical, radiological, and laboratory findings.This case highlights the overlapping clinical and radiological spectrum of diencephalic syndromes, underscoring the necessity of integrated metabolic, autoimmune, and serial neuroimaging workups in complex neurological presentations.

Keywords: Wernicke's Encephalopathy, NMOSD, Mammillary Body Enhancement, Optic Sheath Enhancement, Hypernatremia, CSF Pleocytosis.

How to cite this article: Singh N, Gupta A, Ruparelia A, Dash AK. Diencephalic Encephalopathy with Optic Sheath Enhancement and Severe Hypernatremia: A Diagnostic Dilemma Between Wernicke's Encephalopathy and Atypical NMOSD. Int J Drug Deliv Technol. 2026;16(70s): 1561-1563. DOI: 10.25258/ijddt.16.70s.168

INTRODUCTION

Symmetrical T2/FLAIR signal abnormalities within the medial thalamic regions, periaqueductal gray matter, hypothalamus, and mammillary bodies are classic imaging hallmarks often associated with diencephalic dysfunction. The primary differential diagnoses for this imaging pattern include non-alcoholic Wernicke's encephalopathy, Neuromyelitis Optica Spectrum Disorder (NMOSD), viral encephalitis, primary central nervous system vasculitis, and osmotic demyelination syndromes.

When such radiological features coincide with visual pathway involvement (such as optic nerve sheath enhancement) and severe metabolic disturbances like hypernatremia, establishing a definitive diagnosis becomes challenging. Metabolic derangements can mimic or coexist with primary demyelinating or inflammatory CNS disorders. Prompt recognition through detailed CSF analysis, autoimmune panels, and high-resolution neuroimaging is essential to guide appropriate management and optimize neurological recovery.

Case Presentation

A 36-year-old female presented with altered sensorium and a 1-month history of progressive headache. Initial contrast-enhanced MRI brain demonstrated fairly symmetrical T2/FLAIR hyperintensities in the bilateral medial thalami, hypothalamus, mammillary bodies, substantia nigra, and periaqueductal regions, accompanied by intense post-contrast enhancement of the mammillary bodies, hypothalamus, and left optic nerve sheath. Laboratory evaluation revealed severe hypernatremia (185mEq/L), mild acute kidney injury, and lymphocytic CSF pleocytosis (30 cells/cumm, 90% lymphocytes) with elevated protein (107 mg/dL). Extensive panel testing for neurotropic viruses, cryptococcal antigen, and serum NMO/MOG antibodies were negative, while ANA showed low-titre positivity (1:100 speckled). Follow-up brain MRI showed interval resolution of hyperintensities following stabilization.

INVESTIGATIONS

Table 1: Summary of Biochemical Investigations

Parameter	Finding	Reference Range	Interpretation
Serum Sodium	185.00 mEq/L	135–145	Marked Hypernatremia
Serum Potassium	3.4 mEq/L	3.5–5.00	Mild Hypokalemia

Serum Chloride	149.00 mEq/L	98.00-107.00	Elevated
Blood Urea	60.80 mg/dl	15.00-40.00	Elevated
Serum Calcium	10.60 mg/dL	8.5-10.50	Mildly Elevated
CSF Leucocyte Count	30 cells/cumm	0-5	Lymphocytic Pleocytosis (90% Lymphocytes)
CSF Protein	107 mg/dL	12-60	Elevated
CSF Sugar	134 mg/dL	40-70	Elevated
CSF Neurotropic Virus PCR	Negative	Negative	Viral Panel Clear
Serum NMO/MOG Antibodies	Negative	Negative	Non-Reactive
ANA(IFA)	Positive(1:100)	Negative	Low-Titre Speckled Pattern
Urine Specific Gravity	1.005	1.005-1.030	Dilute/Low-Normal

IMAGING FINDINGS

MRI Brain with Contrast & Contrast MR Venogram (24-Feb-2025):

Symmetrical, ill-defined areas of T2/FLAIR hyperintensity observed in the bilateral medial thalamic regions, periaqueductal gray matter/third ventricle, substantia nigra, mammillary bodies, hypothalamus, and anterior/posterior commissures.

Intense, diffuse post-contrast enhancement noted in the mammillary bodies, hypothalamus, and anterior commissure, with patchy enhancement in the right medial thalamic region.

Post-contrast enhancement identified along the left optic nerve sheath (intracanalicular and intraorbital segments) with minimal enhancement of the pituitary stalk.

MR Venogram: Unremarkable. Normal caliber and flow in all major dural venous sinuses and deep cerebral veins without filling defects or thrombosis.

Radiological Impression: Possibility of Wernicke's encephalopathy vs. Neuromyelitis Optica Spectrum Disorder (NMOSD).

MRI Brain Plain - Follow-up (05-Mar-2025):

Showed slight interval resolution of the T2/FLAIR hyperintensities across the bilateral thalamic, hypothalamic, interpeduncular, and mammillary body regions compared to the previous examination.

No diffusion restriction on DWI/ADC or cerebral hemorrhage on SWI.

2D Echocardiogram (06-Mar-2025):

Normal LV systolic function (EF > 60%) with normal cardiac chamber dimensions.

Intact interatrial and interventricular septa. No pericardial effusion or features of pulmonary hypertension.

Management and Outcome

The patient was managed in the Medical Intensive Care Unit (MICU) with supportive neuro-intensive care. Key therapeutic interventions focused on slow, controlled correction of severe hypernatremia to avoid osmotic demyelination complications, alongside metabolic support and empirical parenteral thiamine therapy. Following clinical stabilization and electrolyte correction, repeat plain neuroimaging at day 10 demonstrated interval regression of diencephalic hyperintensities. Sensorium progressively improved alongside normalization of renal parameters and systemic inflammation markers.

DISCUSSION

The presentation of diencephalic lesion patterns on MRI presents a diagnostic challenge. Involvement of periaqueductal structures, the hypothalamus, medial thalamic nuclei, and mammillary bodies is classically reported in Wernicke's encephalopathy—a metabolic disorder caused by thiamine deficiency. Contrast enhancement of the mammillary bodies is considered a relatively specific radiological sign for active WE.

However, the co-occurrence of left optic nerve sheath enhancement and pituitary stalk involvement raised clinical concern for atypical demyelinating auto-inflammatory processes, specifically Neuromyelitis Optica Spectrum Disorder (NMOSD). Aquaporin-4 (AQP4) receptors are densely expressed in optic nerves and hypothalamic/periventricular regions. Nevertheless, negative serum tests for both NMO and MOG antibodies, combined with non-reactive Extended ANA markers, significantly lowered the likelihood of classical seropositive NMOSD.

Furthermore, the patient presented with severe hypernatremia (185 mEq/L) and low urine specific gravity (1.005). Hypothalamic involvement can impair osmoregulation and thirst mechanisms, leading to central diabetes insipidus or adipsic hypernatremia, which further exacerbates altered sensorium. The elevated CSF protein (107 mg/dL) and lymphocytic pleocytosis (30 cells/cumm) indicated an active neuroinflammatory state, while negative RT-PCR panels effectively ruled out common viral encephalitis.

The radiological resolution on follow-up plain MRI, following metabolic correction and empiric therapy, supports a responsive diencephalic encephalopathy process with prominent metabolic and secondary inflammatory involvement.

CONCLUSION

This case highlights the clinical and radiological overlap between metabolic diencephalic disorders (such as non-alcoholic Wernicke's encephalopathy) and autoimmune CNS disorders (such as NMOSD). Mammillary body enhancement and periaqueductal lesions, even when accompanied by optic sheath changes, necessitate comprehensive evaluation—including serological antibody panels, CSF analysis, and electrolyte monitoring—to avoid misdiagnosis and guide appropriate therapy.

Clinical Message

Diencephalic MRI changes (medial thalamus, mammillary bodies, hypothalamus) should prompt immediate consideration of metabolic encephalopathies alongside demyelinating syndromes.

Mammillary body contrast enhancement is a helpful sign favoring Wernicke's encephalopathy, though negative NMO/MOG serology is needed to exclude seronegative NMOSD variants.

Hypothalamic lesion involvement can lead to secondary osmoregulatory failure and severe hypernatremia, requiring early recognition and controlled fluid/electrolyte resuscitation.

REFERENCES

1. Zhang X, Kattah JC. Astrocytopathy in Wernicke encephalopathy and neuromyelitis optica spectrum disorder: pathogenic differences with occasional clinical and neuroimaging overlap. J Neuroophthalmol. 2024;44(3):310-318.
2. Vasan S, Kumar A. Wernicke Encephalopathy. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026.
3. Qian Z, Wang Y, Zhao L, et al. Wernicke's encephalopathy with diencephalic lesions and metabolic derangements: clinical features and diagnostic insights. Front Neurol. 2025;16:1385102.
4. Xu Q, Tan C, Zhang L, et al. AQP4-IgG-mediated diencephalic syndromes and visual pathway involvement in neuromyelitis optica spectrum disorders. Mult Scler Relat Disord. 2025;88:105742.
5. Khan J, Ahmed M, Hussain S. Radiological reversibility versus clinical outcome in severe diencephalic encephalopathies and thiamine deficiency states. Cureus. 2025;17(1):e78210.