Received: 20 September 2023 | Accepted: 11 December 2023

DOI: 10.1002/ams2.915

ACUTE MEDICINE & SURGERY WILEY

CASE IMAGE

Arterial spin labeling hyperintensity at cerebellar nodulus: Possible indicator in downbeat nystagmus associated with hypomagnesemia

Yutaro Furukawa | **Taketo Suzuki** | **Takeshi Shimazaki** | **Shunsuke Kudo**

Department of Emergency and Critical Care Medicine, Saku Central Hospital Advanced Care Center, Saku, Japan

Correspondence
Shunsuke Kudo, Department of Emergency and Critical Care Medicine, Saku Central Hospital Advanced Care Center, 3400-28 Nakagomi, Saku, Nagano 385-0051, Japan.
Email: indian_river@hotmail.com

A 69-year-old woman with a history of systemic sclerosis was admitted to the emergency department because of vertigo and nausea. She had been prescribed proton pump inhibitors for several years. Physical examination revealed downbeat nystagmus (DBN) in all gaze directions. Laboratory examination revealed hypomagnesemia with a critically low serum magnesium level of 0.1 mg/dL. Head magnetic resonance imaging showed no abnormalities on T1-, T2-, or diffusion-weighted imaging; however, arterial spin labeling (ASL) revealed hyperintensity in the cerebellar nodulus (Figure 1A). She received

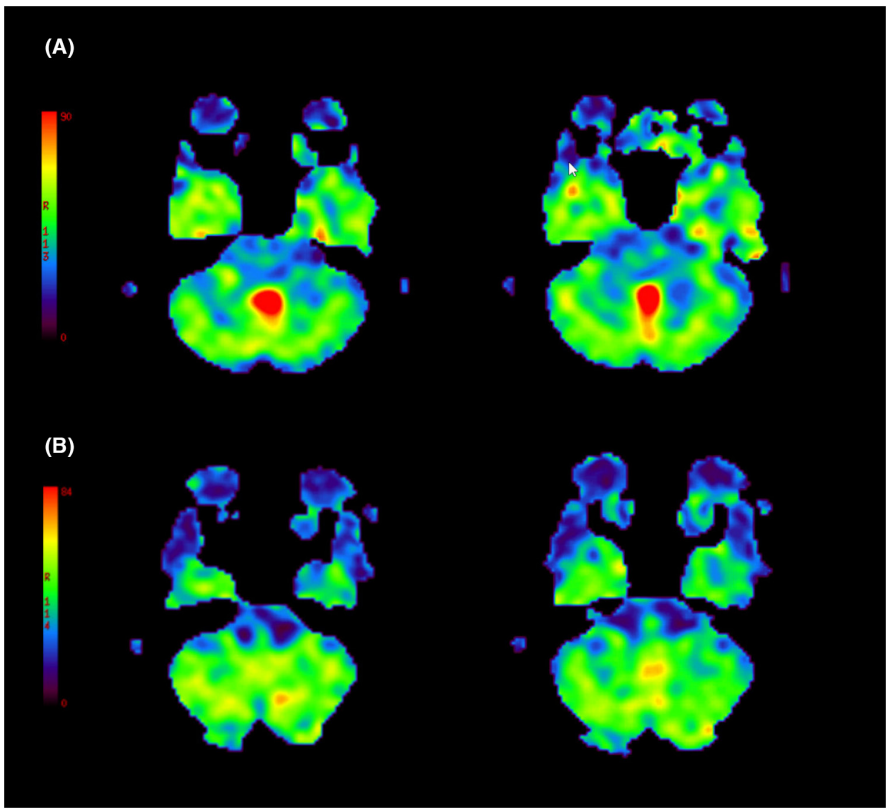

FIGURE 1 (A) A 69-year-old woman with downbeat nystagmus due to hypomagnesemia underwent arterial spin labeling, which revealed hyperintensity in the cerebellar nodulus. (B) After 5 months of follow-up, the magnesium levels normalized. Downbeat nystagmus disappeared and hyperintensity improved.

magnesium supplementation and the proton pump inhibitors were discontinued. After 5 months of follow-up, the DBN disappeared. The magnesium levels normalized to 1.8 mg/dL and hyperintensity improved by ASL imaging (Figure 1B).

Downbeat nystagmus is associated with central vertigo.[1] It occurs due to impairments in the flocculus or nodulus of the cerebellum.[2,3] The underlying causes include congenital malformations, tumors, trauma, localized damage from encephalitis, and local functional issues, such as low magnesium levels.[1,4] A previous study has highlighted that in patients with paraneoplastic DBN, brain fluoro-D-glucose-positron emission tomography (FDG-PET) can identify increased metabolism in the cerebellar nodulus.[5] However, FDG-PET is not generally indicated for the diagnosis of DBN. Our case suggests that similar findings can be easily identified using ASL imaging, which is less invasive and more straightforward. Arterial spin labeling imaging should be considered for patients with DBN, even if other radiological investigations do not reveal any abnormalities.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

ETHICS STATEMENTS

Approval of the research protocol: N/A.
Informed consent: Informed consent was obtained from the patient.
Registry and the registration no. of the study/trial: N/A.
Animal studies: N/A.

ORCID

Shunsuke Kudo https://orcid.org/0000-0002-7174-7174

REFERENCES

1. Wagner JN, Glaser M, Brandt T, Strupp M. Downbeat nystagmus: aetiology and comorbidity in 117 patients. J Neurol Neurosurg Psychiatry. 2008;79:672–7.
2. Kheradmand A, Zee DS. Cerebellum and ocular motor control. Front Neurol. 2011;2:53.
3. Marti S, Straumann D, Glasauer S. The origin of downbeat nystagmus: an asymmetry in the distribution of on-directions of vertical gaze-velocity Purkinje cells. Ann N Y Acad Sci. 2005;1039:548–53.
4. Saul RF, Selhorst JB. Downbeat nystagmus with magnesium depletion. Arch Neurol. 1981;38:650–2.
5. Choi SY, Park S-H, Kim H-J, Kim J-S. Paraneoplastic downbeat nystagmus associated with cerebellar hypermetabolism especially in the nodulus. J Neurol Sci. 2014;343:187–91.

How to cite this article: Furukawa Y, Suzuki T, Shimazaki T, Kudo S. Arterial spin labeling hyperintensity at cerebellar nodulus: Possible indicator in downbeat nystagmus associated with hypomagnesemia. Acute Med Surg. 2023;10:e915. https://doi.org/10.1002/ams2.915