Acquired idiopathic cold-induced hyperhidrosis in a case of dementia with Lewy bodies

Yoshihiko Nakazato, MD

Naotoshi Tamura, MD

Mikiko Ninomiya, MD

Kimiko Yoshimaru, MD

Nobuo Araki, MD

Toshimasa Yamamoto, MD

Cold-induced sweating was originally recognized as a feature of cold-induced sweating syndrome, a rare hereditary disorder associated with skeletal deformities.¹ A rare case of cold-induced hyperhidrosis associated with gustatory sweating due to radical neck dissection has also been reported.² In 2008 we described a case of acquired idiopathic cold-induced hyperhidrosis (AICIH) without any apparent underlying disease. Since then, 5 cases of AICIH have been reported,^{3–6} and it has been suggested that AICIH represents a manifestation of Lewy body disease.^{5,6} We describe herein a case of AICIH associated with dementia with Lewy bodies (DLB).

An 80-year-old man with unusual sweating was admitted to our hospital in 2011. At 70 years old, he first noticed profuse paradoxical sweating on the upper body on sudden exposure to cold environments. Perspiration was normal in hot environments. He denied any family history of sweating disorders. At 76 years old, he began to notice orthostatic dizziness, visual hallucinations, and memory disturbance. On admission, physical examination showed no abnormalities. Orientation and recent memory function were impaired, and Mini-Mental State Examination score was 18. The somatic nervous system appeared to be intact except for the absence of the Achilles tendon reflex. In addition to sweating disturbance (see below), he had orthostatic hypotension: blood pressure was 188/88 mm Hg in the supine position and 91/68 mm Hg in the 60° head-up position, heart rate was 62 beats/min and 71 beats/min, and plasma norepinephrine level was 115 pg/mL and 139 pg/mL, respectively. Results of routine biochemical blood tests were normal. Brain MRI showed diffuse cerebral atrophy and 99m Tc-ethyl cysteinate dimer SPECT examination showed reduced blood flow in the occipital lobes. Subsequent ¹²³I-metaiodobenzylguanidine (MIBG) myocardial scintigraphy revealed reduced heart-to-mediastinum ratios (early phase, 1.35; delayed phase, 1.21) of MIBG uptake. MIBG scintigraphy is widely used in Japan as a sensitive biomarker for Parkinson disease, DLB, or pure autonomic failure (PAF) in place of fluorodopamine myocardial PET.

Practical Implications

Consider Lewy body disease in the differential diagnosis of cold-induced hyperhidrosis.

Department of Neurology, Saitama Medical University, Japan.

Funding information and disclosures are provided at the end of the article. Full disclosure form information provided by the authors is available with the **full text of this article at Neurology.org/cp.**

Correspondence to: nakachan@saitama-med.ac.jp

Figure Cold-induced sweating

Patient soaking feet in cold water.

On the thermoregulatory sweating test (TST), sweating was absent in the lower limbs but normal on the trunk and upper limbs when the patient was warmed. We performed the mental sweating examination according to the methods of a previous article.⁷ Mental sweating response was decreased in the thumbs. The quantitative sudomotor axon reflex test (QSART) showed normal response in both the right forearm and right lower leg. Cold-induced sweating was confirmed using the Minor iodine-starch method. We put the lower extremities in cold water and cooled the body in a cold bathroom, and cold-induced sweating immediately occurred on the upper limbs and upper part of the back (figure). Cold-induced hyperhidrosis gradually improved after oral administration of clonidine, a presynaptic α_2 adrenoceptor stimulant with central sympatholytic activity, and it completely disappeared 2 weeks later. The orthostatic dizziness was not aggravated by clonidine treatment. The patient was diagnosed with DLB based on the clinical findings of dementia with visual hallucination and autonomic failure, low cerebral blood flow in the occipital lobe on SPECT, and decreased uptake on MIBG scintigraphy. Only 5 cases of AICIH have been reported to date: 4 from Japan, including our 3 cases, and 1 from Chile (table).³⁻⁷ All cases involved elderly men. TST showed anhidrosis in the trunk (case 3) and lower limbs (the present case) in 2 cases. Cold-induced hyperhidrosis involved the upper part of the body in all cases.

The present patient (case 5) showed DLB, and the patient described by Idiaquez et al. (case 3) showed PAF. The patient described by Tsuge et al. (case 4) had clinically isolated AICIH, but he demonstrated reduced myocardial uptake on MIBG, suggesting Lewy body pathology (incidental Lewy body disease). AICIH may be a clinical manifestation of the Lewy body disease spectrum. The autonomic nervous system lesions in the present case were probably multifocal. While decreased plasma norepinephrine level and reduced MIBG uptake indicated postganglionic cardiovascular sympathetic dysfunction, normal QSART response in the anhidrotic area of the lower part of the body suggested preganglionic or central sudomotor dysfunction. As for cold-induced hyperhidrosis occurring in the upper part of the body, the causal lesions seemed to exist within the central structure, since treatment with clonidine proved to

Table Summary of the 5 cases of AICIH

Case	Age at onset/age at examination, y	Accompanying symptoms	TST	CIH	QSART, arm	OH, systolic BP	¹²³ I-MIBG H/M ratio	Thoracic MRI	Brain MRI	Effective drugs
1 ³	58/64	Hypertension, chronic renal failure	Normal	Chest and back	Normal	None	ND	Normal	Multiple lacunar infarction	Amitriptyline
2 ⁴	55/62	None	Normal	Chest and back	ND	None	ND	Normal	Normal	Clonidine, amitriptyline
3 ⁵	66/76	Nocturnal supine hypertension (PAF)	Anhidrosis in the face and trunk	Upper back	ND	▼ 89	ND	ND	Normal	ND
4 ⁶	66/76	None	Normal	Neck, chest, and arms	ND	None	Early phase 1.35, delayed phase 1.13	Normal	Normal	Clonidine, amitriptyline
Present case	70/80	Dementia, visual hallucination (DLB)	Anhidrosis in the lower limbs	Chest and upper limbs	Normal	▼ 94	Early phase 1.35, delayed phase 1.21	ND	Diffuse atrophy	Clonidine

Abbreviations: ¹²³I-MIBG = ¹²³I-metaiodobenzylguanidine; AICIH = acquired idiopathic cold-induced hyperhidrosis; BP = blood pressure; CIH = cold-induced hyperhidrosis; DLB = dementia with Lewy bodies; H/M = heart-to-mediastinum; ND = not done; OH = orthostatic hypotension; PAF = pure autonomic failure; QSART = quantitative sudomotor axon reflex test; TST = thermoregulatory sweating test.

Sex: All Men.

be effective. Central lesions also seem to cause cold-induced afferent misinput into the thermoregulatory center.

When cold-induced hyperhidrosis is present, Lewy body disease should be considered.

REFERENCES

1. Hahn AF, Jones DL, Knappskog PM, Boman H, McLeod JG. Cold-induced sweating syndrome. A report of two cases and demonstration of genetic heterogeneity. *J Neurol Sci* 2006;250:62–70.
2. Hess K, Reinecke M, Clodius L, Schwarz U. Paradoxical focal hyperhidrosis in response to cold after faulty regeneration. *Eur Neurol* 2004;51:241–243.
3. Nakazato Y, Tamura N, Ohkuma A, Ninomiya M, Araki N. Acquired idiopathic cold-induced hyperhidrosis [in Japanese]. *Auton Nerv Syst* 2008;45:259–262.
4. Yoshimaru K, Nakatzato Y, Tamura N, Araki N. Two cases of acquired cold-induced hyperhidrosis [abstract, in Japanese]. *Jpn J Pers Res* 2010;17:63–65.
5. Idiaquez J, Fadic R, Verdugo R, et al. Pure autonomic failure with cold induced sweating. *Auton Neurosci* 2013;176:98–100.
6. Tsuge A, Kaneko S, Wate R, Yamazaki F, Kusaka H. Case of acquired idiopathic cold-induced hyperhidrosis. *Neurol Clin Neurosci* 2013;1:114–115.
7. Asahina M, Suzuki A, Mori M, Kanesaka T, Hattori T. Emotional sweating response in a patient with bilateral amygdala damage. *Int J Psychophysiol* 2003;47:87–93.

STUDY FUNDING

No targeted funding reported.

DISCLOSURES

The authors report no disclosures. Full disclosure form information provided by the authors is available with the **full text of this article at Neurology.org/cp**.