

CASE REPORT

# Posterior Type of Alzheimer's Dementia Presenting with Homonymous Hemianopsia

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**Background** Alzheimer's disease is a chronic neurodegenerative condition, mostly affecting the medial temporal lobe and associated neocortical structures. In this report, we present a rare clinical manifestation of this disease.

**Case Report** A 61-year-old female with word finding difficulty and memory disturbances was diagnosed with Alzheimer's disease. Two years later, she complained of right homonymous hemianopsia without optic ataxia, ocular apraxia, and simultagnosia. No findings other than parenchymal disease were apparent in magnetic resonance imaging and laboratory tests.

**Conclusions** In this case, in a patient initially diagnosed with Alzheimer's dementia with progressive disease, we found only homonymous hemianopsia, without signs of Balint's syndrome or Gerstmann's syndrome. After careful investigation showing that Alzheimer's dementia with visual symptom was not associated with parenchymal disease, we concluded a case of atypical variant of Alzheimer's disease.

**Key Words** hemianopsia, Alzheimer's disease, posterior cortical atrophy.

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## INTRODUCTION

Alzheimer's disease is a chronic neurodegenerative condition, mostly affecting the medial temporal lobe and associated neocortical structures.<sup>1</sup> Cognitive decline is the most common symptom. Other atypical symptoms include behavioral and personality changes, Balint's syndrome, and Gerstmann's syndrome.<sup>2</sup>

Here we report a case of Alzheimer's disease with homonymous hemianopsia without evidence of another parenchymal brain disease. Posterior cortical atrophy with hemianopsia was previously reported in Italy<sup>3</sup> and Japan.<sup>4</sup> However, to the authors' knowledge, this is the first report of Alzheimer's disease with homonymous hemianopsia in Korea.

## CASE REPORT

In 2012, a 61-year-old female visited the clinic with word-finding difficulty and memory disturbances. Her family complained that she had trouble retrieving words and took longer to answer questions. She had no past medical history except for hypertension. We carried out neurologic and neuropsychological evaluation, including a Korean version of Mini-Mental State Examination (K-MMSE), brain magnetic resonance imaging (MRI), and further laboratory tests.

No abnormal findings were apparent in neurological and physical examination except impairment in delayed recall. However, the neuropsychological test revealed impairment in general neurocognitive function, especially in language, visual and verbal memory, and recognition (Table 1).

Electroencephalography and other laboratory findings were normal. Brain MRI showed mild cortical atrophy (Fig. 1). We diagnosed the patient with probable Alzheimer's disease, and she visited the clinic regularly.

Two years later, she complained she could not detect objects on her right side. Ophthalmologic testing revealed right-side

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**Table 1.** Neuropsychological test results

Cognitive domain	Neuropsychological tests	Results (%tile)	Standard score
Attention	Digit span forward	6 (69.50)	0.51
	Digit span backward	2 (0.29)	-2.76
Language	Spontaneous speech: fluency	Non-fluent	
	Spontaneous speech: contents	Normal	
	Comprehension	Normal	
	Repetition	15	
	Korean-Boston Naming Test	N/A	
	Reading	Normal	
	Writing	Normal	
	Finger naming	Normal	
	Right-left orientation	Abnormal	
	Body part identification	Abnormal	
	Calculation	0 (<16)	
Visuospatial functions	Praxis	5 (≥16)	
	RCFT copy score	5 (0.01)	-8.67
Memory	SVLT immediate recalls	13 (11.31)	-1.21
	SVLT delayed recall	1 (0.38)	-2.67
	SVLT recognition	19 (8.08)	-1.4
	RCFT immediate recall	0 (1.36)	-2.21
	RCFT delayed recall	0 (0.1)	-3.08
	RCFT recognition	13 (0.19)	-2.89
Frontal/executive function	Motor impersistence	Normal	
	Contrasting program	N/A	
	Go-no-go	N/A	
	Fist-edge-palm	Abnormal	
	Alternating hand movement	Abnormal	
	Alternating square & triangle	N/A	
	Luria loop	Deformed	
	COWAT	N/A	N/A

COWAT: Controlled Oral Word Association Test, RCFT: Ray Complex Figure Test, SVLT: Seoul Verbal Learning Test.

homonymous hemianopsia (Fig. 2). There were no abnormal findings associated with ophthalmic disease.

The patient visited the hospital for further investigations. Her vital signs were stable and MRI of her brain did not reveal any symptoms of parenchymal disease, such as cerebrovascular disease (Fig. 1). Her K-MMSE score declined to 13. Neurological examination did not show ocular apraxia, or simultagnosia. In addition, there was no sign of agraphia or finger agnosia. The patient diagnosis was posterior type of Alzheimer's disease.

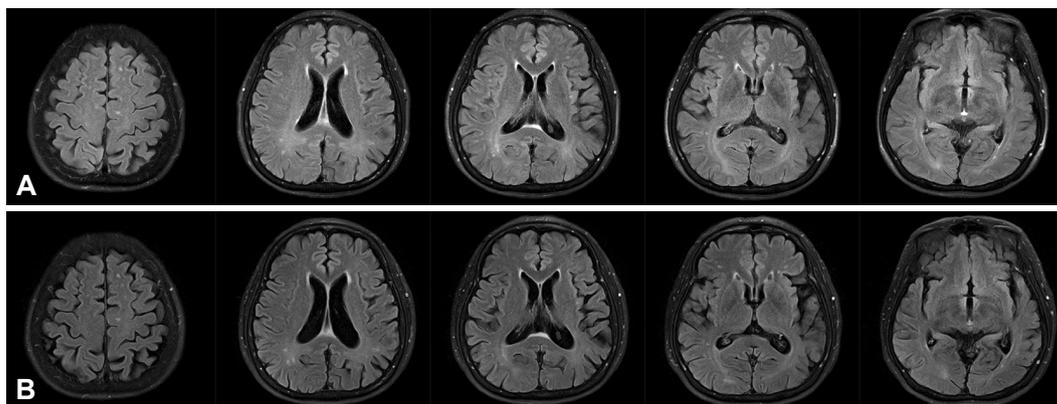
Informed consent was obtained for the case report.

## DISCUSSION

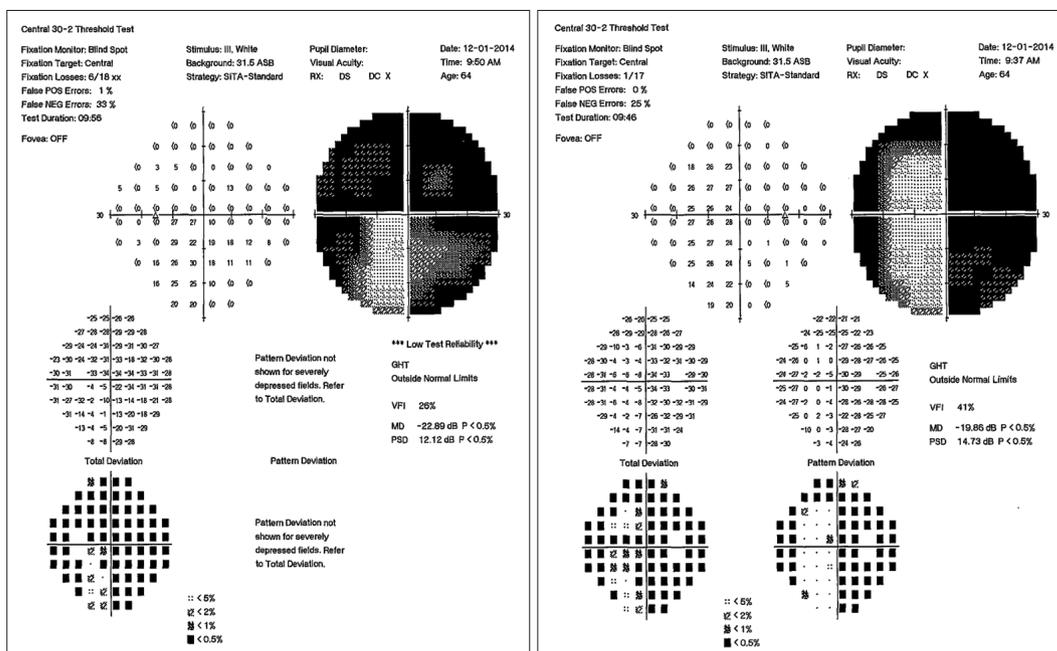
In 1988 Benson et al.<sup>5</sup> reported patients with visual symptoms without ophthalmic problems, a syndrome later termed posterior cortical atrophy. The most common features of this

condition involve visuospatial impairments, alexia, and features of Balint's and Gerstmann's syndrome.<sup>6</sup> Executive and memory functions are intact in the early stages of this condition. Alzheimer's disease is the most common underlying cause of posterior cortical atrophy, which has been regarded as a variant of Alzheimer's dementia. However, currently pathological features such as Lewy bodies, prion disease, or corticobasal ganglionic syndrome are associated with posterior cortical atrophic syndrome.<sup>7,8</sup>

Compared with the cases reported in Italy and Japan, our patient showed a relatively early impairment in executive function and memory. In addition, considering the fact that posterior cortical atrophy or visual variant of Alzheimer's dementia usually affects the right hemisphere more severely, the right-side hemianopsia involving left hemisphere is an atypical presentation.<sup>9,10</sup> Also, no signs of Balint's or Gerstmann's syndrome were observed, except for right-left disorientation.



**Fig. 1.** Brain magnetic resonance image (MRI) taken in 2012, 2014. A: MRI obtained in 2012 shows mild cortical atrophy, without any evidence of parenchymal diseases. B: Brain MRI in 2014. Compared with A progressive cortical atrophy occurred without evidence of parenchymal disease.



**Fig. 2.** Visual field test showed right-side homonymous hemianopsia.

However, several reports suggest that hemianopsia is a rare first symptom of posterior cortical atrophy<sup>11-13</sup> and eventually affects the higher visual functions.<sup>6</sup> We suggested a retrochiasmatic deficit of the visual pathway as the pathology of Alzheimer's disease such as neurofibrillary tangles and senile plaques progressed and affected primary visual cortex and associated visual area.<sup>14</sup> Although the patient's neurologic examination and perimetry showed homonymous hemianopsia, we cannot exclude unilateral right optic ataxia. To the best of our knowledge, no report of unilateral optic ataxia involving posterior cortical atrophy is available. However, it is known that unilateral optic ataxia can occur when contralateral parietal lobule is affected.<sup>15,16</sup> Therefore, unilateral optic ataxia

may develop as Alzheimer's disease progressed in the left parietal lobule, masked by homonymous hemianopsia.

The primary symptoms of posterior cortical atrophy and visual variant of the Alzheimer's dementia are predominantly visual and patients often visit ophthalmology clinic initially.<sup>17,18</sup> However, with this case, we insist the importance of considering neurodegenerative disease in elderly patients with visual defects.

**Conflicts of Interest**

The authors have no financial conflicts of interest.

## REFERENCES

1. De-Paula VJ, Radanovic M, Diniz BS, Forlenza OV. Alzheimer's disease. *Subcell Biochem* 2012;65:329-352.
2. Apostolova LG. Alzheimer disease. *Continuum (Minneapolis)* 2016; 22(2 Dementia):419-434.
3. Pellegrini F, Lee AG, Zucchetta P. Homonymous hemianopsia due to posterior cortical atrophy. *Neuroophthalmology* 2017;41:154-158.
4. Ishiwata A, Kimura K. Homonymous hemianopsia associated with probable Alzheimer's disease. *J Nippon Med Sch* 2016;83:87-92.
5. Benson DF, Davis RJ, Snyder BD. Posterior cortical atrophy. *Arch Neurol* 1988;45:789-793.
6. Crutch SJ, Lehmann M, Schott JM, Rabinovici GD, Rossor MN, Fox NC. Posterior cortical atrophy. *Lancet Neurol* 2012;11:170-178.
7. Renner JA, Burns JM, Hou CE, McKeel DW Jr, Storandt M, Morris JC. Progressive posterior cortical dysfunction: a clinicopathologic series. *Neurology* 2004;63:1175-1180.
8. Tang-Wai DF, Graff-Radford NR, Boeve BF, Dickson DW, Parisi JE, Crook R, et al. Clinical, genetic, and neuropathologic characteristics of posterior cortical atrophy. *Neurology* 2004;63:1168-1174.
9. Snowden JS, Stopford CL, Julien CL, Thompson JC, Davidson Y, Gibbons L, et al. Cognitive phenotypes in Alzheimer's disease and genetic risk. *Cortex* 2007;43:835-845.
10. Mendez MF, Ghajarian M, Perryman KM. Posterior cortical atrophy: clinical characteristics and differences compared to Alzheimer's disease. *Dement Geriatr Cogn Disord* 2002;14:33-40.
11. Shea YF, Chu LW. Visual field defect as an uncommon presentation of posterior cortical atrophy. *Geriatr Gerontol Int* 2014;14:1003-1004.
12. Cordano C, Alessandria G, Leonardi A, Cellerino M, Nourbakhsh B, Nobili F, et al. Homonymous hemianopia as the first sign of posterior cortical atrophy. *J Neurol Sci* 2017;373:38-40.
13. Wan SL, Bukowska DM, Ford S, Chen FK. Posterior cortical atrophy presenting with superior arcuate field defect. *Case Rep Ophthalmol Med* 2015;2015:796381.
14. Goodwin D. Homonymous hemianopia: challenges and solutions. *Clin Ophthalmol* 2014;8:1919-1927.
15. Auerbach SH, Alexander MP. Pure agraphia and unilateral optic ataxia associated with a left superior parietal lobule lesion. *J Neurol Neurosurg Psychiatry* 1981;44:430-432.
16. Perenin MT, Vighetto A. Optic ataxia: a specific disruption in visuo-motor mechanisms. I. Different aspects of the deficit in reaching for objects. *Brain* 1988;111(Pt 3):643-674.
17. Lee AG, Martin CO. Neuro-ophthalmic findings in the visual variant of Alzheimer's disease. *Ophthalmology* 2004;111:376-380.
18. Vighetto A. Towards an earlier diagnosis of Alzheimer's disease presenting with visuospatial disorders (posterior cortical atrophy). *Rev Neurol (Paris)* 2013;169:687-694.