A Dementia with Lewy Bodies Patient Presents Primary Progressive Aphasia

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Abstract: Dementia with Lewy bodies (DLB) is a popular cause of dementia that clinically manifests as dementia with any combination of parkinsonism, psychosis, delusion, hallucination and pareidolia and rapid eye movement sleep behavior disorder (RBD). However, aphasia is not its suggestive diagnostic feature. Another hand, primary progressive aphasia (PPA) is a neurological syndrome in which language capabilities become slowly and progressively impaired. PPA can be divided into three variants: the agrammatic variant (PPA-G), the semantic variant (PPA-S), and the logopenic variant (PPA-L). Mesulam suggested frequent associations between PPA-G and frontotemporal lobar degeneration (FTLD), between the PPA-S and FTLD, and between PPA-L and AD.

The PPA-L is characterized by fluent but sparse spontaneous speech caused by word finding difficulty and severely impaired sentence repetition. Accumulated evidence suggests that a wide variety of disorders including DLB can develop PPA. We report a DLB patient with PPA-L.

Keywords: Dementia with Lewy bodies (DLB), primary progressive aphasia (PPA), the agrammatic variant (PPA-G), the semantic variant (PPA-S), the logopenic variant (PPA-L).

INTRODUCTION

Dementia with Lewy bodies (DLB) is a popular cause of dementia that clinically manifests as dementia with any combination of parkinsonism, psychosis, delusion, hallucination and pareidolia and rapid eye movement sleep behavior disorder (RBD) [1, 2]. However, progressive aphasia is not its suggestive diagnostic feature. Mesulam introduced primary progressive aphasia (PPA) in which language capabilities become slowly and progressively impaired without overt dementia [3]. Originally two subtypes of PPA: the agrammatic variant (PPA-G) and the semantic variant (PPA-S) were described. Laterly the logopenic variant (PPA-L) was introduced.

PPA-G presents agrammatic or telegraphic verbal and written output. Difficulties with verbal comprehension, reading comprehension, writing, and naming may be present. Dysarthria may also be present. The dominant features of PPA-S are anomia and poor single-word comprehension. Verbal output is grossly normal with regard to grammar, syntax, average phrase length, and prosody, excluding pauses for word retrieval. Anomia is most striking on confrontational naming. Performance on single-word comprehension tasks should be poorer than comprehension of complex sentences containing individual words that are comprehended. Verbal output characteristics of PPA-L are not agrammatic or telegraphic. Speech may be hesitant and slow from pauses for apparent word retrieval or verbal formulation efforts. There is poor retention of spoken stimuli, resulting in poor repetition that typically increases with stimulus length and complexity. Performance on tasks involving single-word comprehension should be better than on those that involve complex sentence comprehension. Anomia is usually present, but target words should be recognized on the majority of items [3-8].

The classification of PPA into these three subtypes is a relatively recent development, and the terminology and criteria for these subtypes are still somewhat inconsistent among investigators [4-8]. Several pathologies have been demonstrated in PPA such as corticobasal degeneration (CBD), progressive supranuclear palsy (PSP), frontotemporal lobar degeneration (FTD), or Alzheimer's disease (AD). However, dementia with Lewy bodies (DLB) is rarely reported in patients with PPA [9-12].

We present an 83-years-old man who had PPA and clinical features of DLB. Reports concerning DLB presenting with PPA might be useful for considering the spectrum of DLB.

CASE REPOT

The patient was a right-handed man with 16 years of education and had worked as engineer until his 65

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years old. A year before admission, he complained of progressive speech impairment, but his memory function was relatively preserved and his functional daily independence was well-preserved. At this time, he had been experiencing repeated visual hallucinations of an unfamiliar person or animals. His word-finding difficulties became progressively worse, and he had difficulty communicating thoughts even with his family members because of severe anomia in conversation. Adding to these, his wife described his sleep shouting with rough limb movements like in fights and recurrent visual hallucinations at night (kids standing in his bedroom), pareidolia (electric socket mislooking as human face, ceiling stains mistaking for insects), which are characteristic symptoms of DLB [13, 14]. He had no signs of parkinsonism including rigidity, bradykinesia and resting tremor.

In another hospital, he was diagnosed with AD. Then he was introduced our hospital for further examination.

At the initial exam, physical and neurological examinations and routine laboratory tests showed no abnormalities, but he had difficulties to express his thought. On neurological examination, his speech was frequently interrupted with pauses, prominent anomia for nouns. He also showed poor confrontation naming ability. He was unable to correctly repeat sentences of more than 5 syllables and to follow complex verbal commands. But, he showed no semantic deficit or agrammatism. In mini-mental state examination (MMSE), his total score was 23. In digit span, he could recall 5 in forward and 3 for back ward. In phonemic fluency (letter “ka”), he could raise only 3 words. In Modified Boston Naming Test (60 items), he could correctly answer 45 items. Aphasia Quotient of the Western Aphasia Battery (WAB) was 85.4 (normal range is above 93.8), and subtest scores; fluencey 7; comprehension 8; repetition 3; naming 7 [15].

Brain magnetic resonance imaging (MRI) revealed relative preserved volume of the medial temporal lobe including hipocampus and atrophy in the bilateral perisylvian fissure (Figure **1**). There was no evidence of hemorrhage or ischemic lesions. N-iso-propyl-p-[^{123}I] iodoamphetamine single-photon emission computed tomography (SPECT) data analyzed with an easy Z-score imaging system found hypoperfusion predominantly in the right but bilateral temporoparietal region and in the bilateral precuneus and the bilateral posterior cingulate cortex (Figure **2**). SPECT imaging with ^{123}I-ioflupane found reduced dopamine transpoter (DAT) uptake in the striatum [Specific Binding Ratio (SBR) = R: 2.55, L: 3.44] (Figure **3**). These brain imaging study support to diagnose him as having DLB [13]. 11C- Pittsburgh Compound-B (PIB) PET imaging showed no cortical PiB binding.

Because of his spontaneous speech characterized by word-finding difficulties and imaging studies, we diagnosed him as PPA-L [16, 17]. We consulted him a speech pathologist in our hospital.

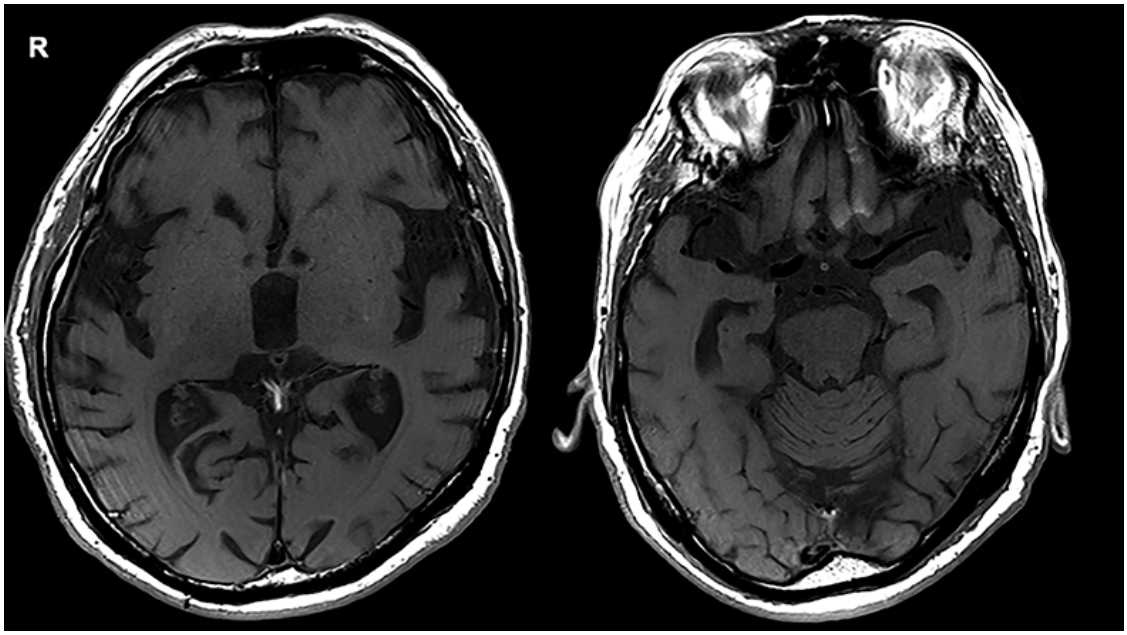

Figure 1: Brain magnetic resonance imaging (MRI) revealed relative preservation of the medial temporal lobe and atrophy in the bilateral perisylvian area.

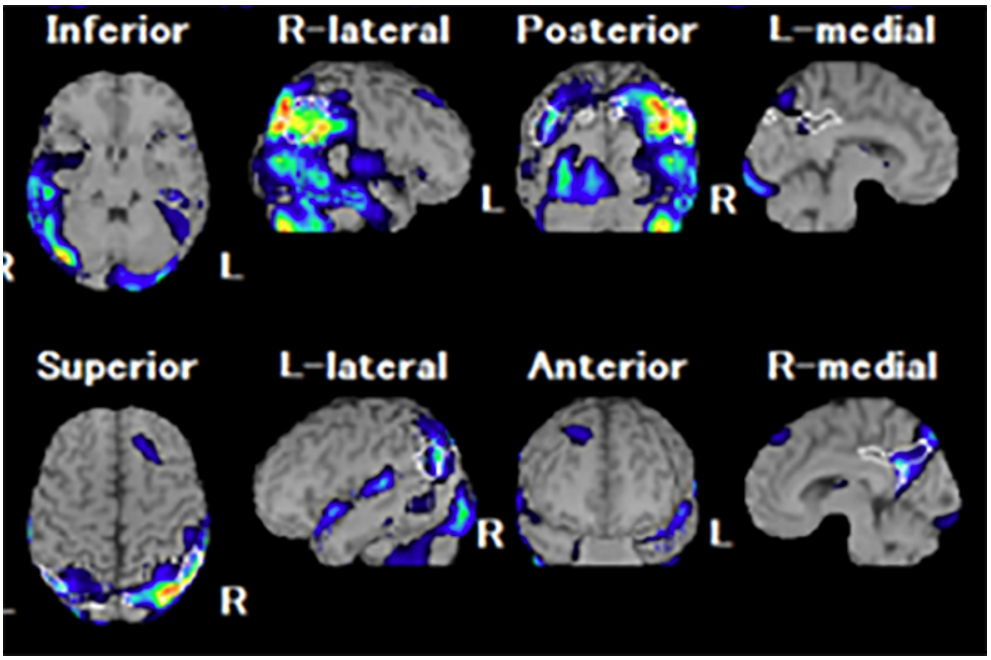

Figure 2: N-iso-propyl-p-[^{123}I] iodoamphetamine single-photon emission computed tomography (SPECT) data analyzed with an easy Z-score imaging system found hypoperfusion in the right-predominant bilateral temporoparietal region and in the bilateral precuneus/posterior cingulate cortex.

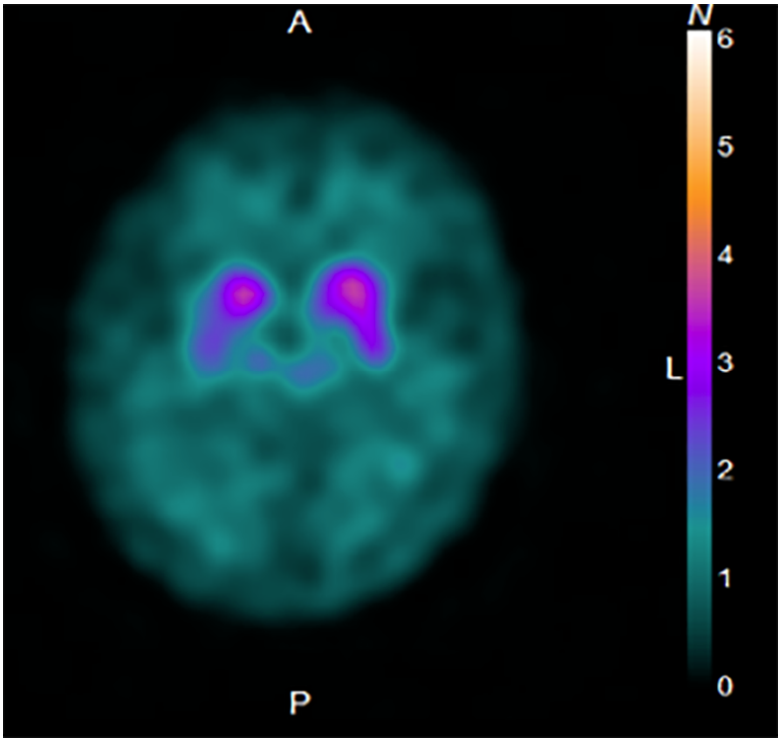

Figure 3: ^{123}I-ioflupane SPECT (dopamine transporter scan) showed reduced striatal uptake.

DISCUSSION

The patient exhibited the core clinical features of DLB, including visual hallucinations, fluctuating cognition, and RBD. In addition, he showed reduced DAT uptake in the striatum. These features met the criteria for probable DLB [13]. Notably, the unique feature of him was the presentation of aphasia that was seldom observed in DLB. As far as we can find in the literature, two patients with PPA-G, three patients with PPA-L, eight patients with PPA-S, and an unclassified patient [9-12, 16, 18]. The patient showed a

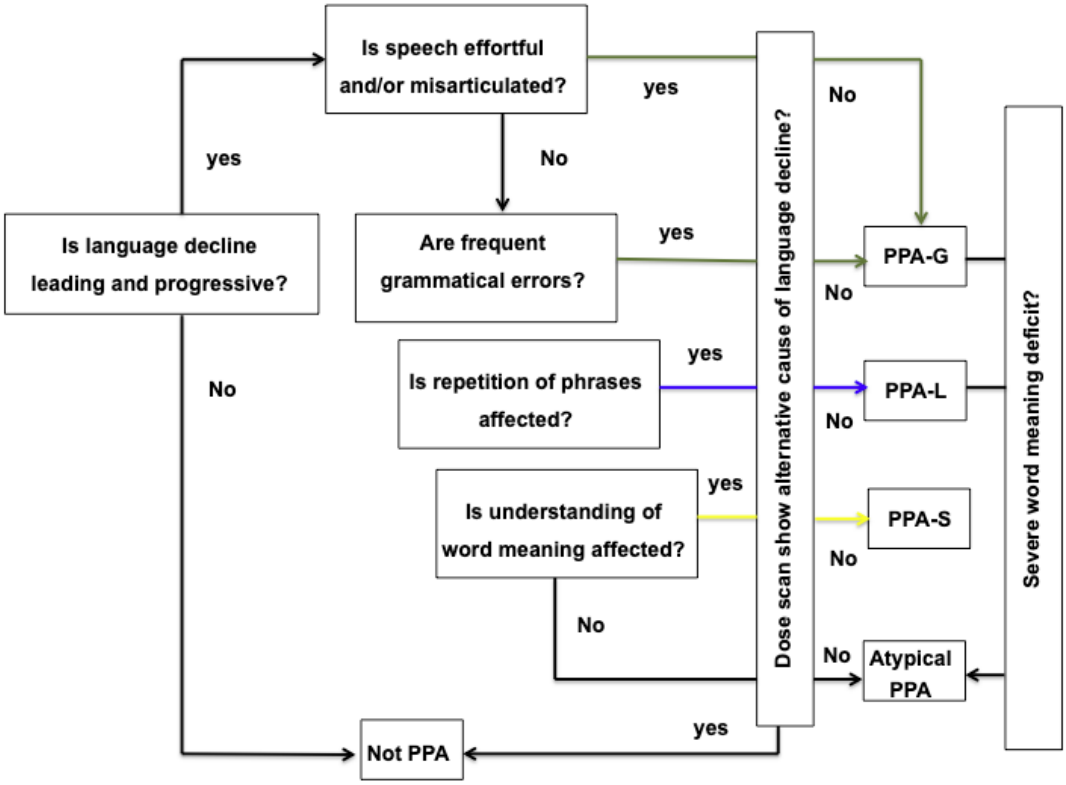

Figure 4: A clinical 'road map' for diagnosing the PPA subtypes – adapted from Volkmer *et al*, 2019.19.
'Atypical' PPA here includes the unclassified or 'not otherwise specified' group of patients.
PPA-L, logopenic variant; PPA-G, agrammatic variant ;PPA-S, semantic variant.

constellation of language symptoms typical of PPA-L, such as impaired single-word retrieval and sentence repetition, without severe agrammatism, semantic deficit or motor speech impairment. The MRI finding of relative preservation of the medial temporal lobe and atrophy in the bilateral perisylvian area and SPECTfinding of hypoperfusion in the right-predominant bilateral temporoparietal region supported diagnosis of PPA-L.

Some provided insights into underlying AD pathology in DLB with PPA, but the patient showed no cortical PiB binding by 11C- PIB PET suggests that the burden of AD pathology is relatively low in the patient [16, 17, 19]. On the other hand, he had REM sleep behavior disorder and showed reduced DAT uptake in the striatum that supported diagnosis of DLB. Aphasia is not common in DLB, but patients with Parkinson disease with dementia (PDD) and DLB have significant difficulty organizing their narrative speech [20].

Although there are currently no curative treatments or symptomatic pharmacological therapies for PPA, speech and language therapists have developed several impairment-based interventions and compensatory strategies for use in the clinic. However, unawareness of PPA among clinician, caregivers even speech and language therapists is a barriers to improve access to care for people with PPA. A number of studies have demonstrated that word retrieval interventions can be helpful for people with PPA [21], few studies have implemented interventions to improve fluency in PPA-G [22], and limited research on functional communication focused interventions for people with PPA [23]. There is no evidenced based speech and language therapy for PPA. However, patients with PPA have the potential to benefit from person-centred speech and language therapy. Thus, patients should be referred to speech and language therapy as early as possible.

In summary, we describe a patient with PPA-L. He showed imaging evidence of LBD but AD pathology. This report may be useful for studying pathological mechanism of PPA as well as DLB.

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