

CASE REPORT

Atypical Parkinsonism: Methamphetamine may play a role

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Funding information

The authors did not receive any funding

Abstract

Abusing methamphetamine can be considered as an agent that can cause or affect the course of atypical parkinsonian syndromes (APS), which may raise attention regarding preventing abusing these drugs.

KEYWORDS

APS, atypical parkinsonism, methamphetamine, Parkinsonism

1 | INTRODUCTION

Parkinsonism refers to a group of neurological disorders with movement abnormalities such as bradykinesia, tremor, rigidity, and postural instability. Parkinsonism has several types that fall into two main groups: primary and secondary. Primary parkinsonism, or idiopathic parkinsonism, occurs due to neurodegeneration, and secondary parkinsonism is caused by vascular problems, infections, toxins, and drugs which block dopamine action.^{1,2} Moreover, other secondary sporadic parkinsonism is atypical parkinsonism or atypical parkinsonian syndromes (APS). These are defined as progressive diseases that include signs and symptoms similar to those seen in Parkinson's disease (PD) with faster deterioration and less responsive to treatment with levodopa. Consequently, they are difficult to distinguish from Parkinson's disease (PD), especially in the early stages.³ Atypical parkinsonian syndromes include progressive supranuclear palsy (PSP), multiple system atrophy (MSA), corticobasal degeneration

syndrome (CBS), and dementia with lewy bodies (DLB). These syndromes vary in clinical presentation and etiology. DLB and MSA occur due to abnormal deposition of α -synuclein protein, and are categorized as synucleinopathies, but PSP and CBS are caused by the accumulation of tau protein, known as tauopathies.

Furthermore, various studies have shown that methamphetamine (Meth) exposure makes people and rats more susceptible to PD.⁴⁻⁷ However, to the best of our knowledge, atypical parkinsonism associated with Meth has not been reported before.

Herein, we report two cases who abused Meth and developed atypical Parkinsonism.

2 | CASE 1

A 76-year-old man with a 2-year history of Parkinsonism presented to the movement disorders clinic. His caregiver complained of insomnia, rapid eye movement (REM) sleep

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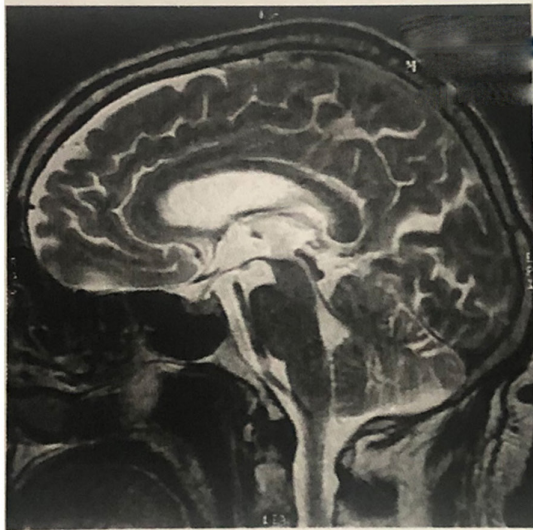
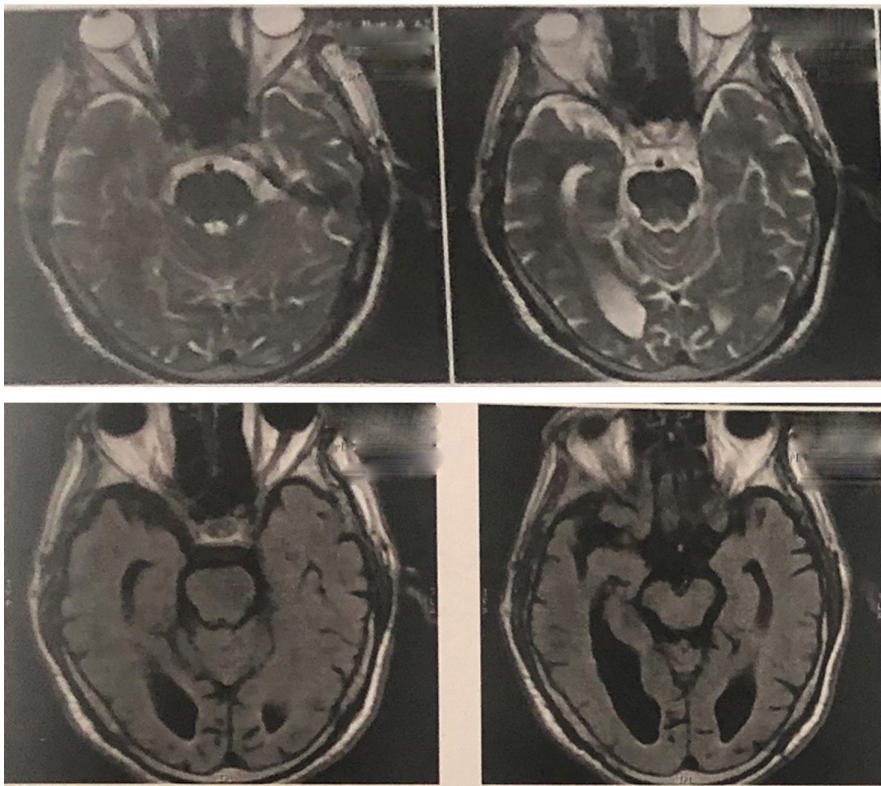


FIGURE 1 Sagittal T2 and axial FLAIR and T2 MRI show generalized atrophy



behavior disorder (RBD), and constipation. Moreover, they noted that he has been abusing crystal meth for three years which he quit three years ago, and he had a medical history of diabetes mellitus.

He was on amantadine (100 mg/day) and levodopa/benserazide 100/25 mg (four times a day) for 2 years without obvious benefit. His family history was unremarkable.

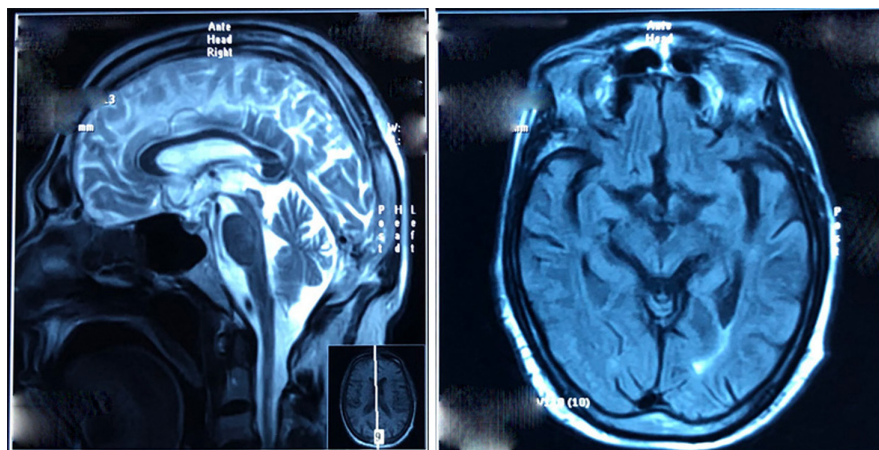
On examination, he had severe bradykinesia, mild rigidity, could not walk without help, and while walking, he had freezing. His cognition and eye movements were intact; he did not have pyramidal, cerebellar, and sensory deficits. Tremor was not detected. He did not have orthostatic hypotension, urinary dysfunctions, and erectile dysfunction.

We increased levodopa gradually to 1000 mg per day and started donepezil 5 mg for gait freezing, but after 3 months of follow-up, there were no signs of improvement. On imaging, brain magnetic resonance imaging (MRI) revealed generalized atrophy (Figure 1). Routine blood examinations were performed, which showed no pathological findings.

3 | CASE 2

A 68-years-old man was referred to our movement disorders clinic with several episodes of backward fallings, which started 3 years ago, and made him wheelchair bound after 1 year.

FIGURE 2 Sagittal T2 and axial FLAIR MRI show generalized atrophy with prominent midbrain atrophy



His past medical history and family history were unremarkable; he was on amantadine (3 times a day), and levodopa/benserazide 200/50 mg (four times a day). He has been using methamphetamine for 10 years.

In his visit, he complained about having trouble sleeping, dysphagia, and speech difficulties. He also mentioned urinary urgency and incontinence. Neurological examination revealed vertical gaze palsy, bradykinesia, and rigidity, but no tremor. He could not walk without assistance, and while walking, he had bent knees and camptocormia. (Video S1) The Montreal Cognitive Assessment (MoCA) score of the patient was 19. He did not have any pyramidal, cerebellar, or sensory deficits.

Blood examinations showed no pathological findings. Brain MRI showed humming bird sign (Figure 2).

4 | DISCUSSION

Recognizing the neurodegenerative side effect of Meth as a highly used drug is critical in preventing and managing abusers. In this case report, we are attempting to make a case for considering methamphetamine as an agent causing atypical Parkinsonism. Although these conditions are not generally treatable, it is still important to correctly diagnose the condition as soon as possible.^{1,2}

As far as we know, there are no reports on Meth-induced APS in humans. However, it is indicated that Meth abuse causes damage to dopaminergic neurons, and can develop symptoms of dopamine-related disorders and a 3-fold increased risk of Parkinson's disease.⁴ It is also suggested that chronic Meth administration in mice directly increases alpha-synuclein (α -syn) level, and the excess α -syn might indirectly promote tau phosphorylation. Both direct and indirect effects of Meth lead to neurodegeneration processes resulting in some clinical findings. Studies have also implied that reducing the level of α -syn might protect against neurodegeneration induced by Meth.^{8,9}

In this study, we discussed two Meth abusers with Parkinsonism symptoms. Although the clinical phenotype of case 1 was closer to MSA-P, and case 2 was more similar to PSP, case 1 did have autonomic dysfunctions, and imaging did not show typical signs of MSA. Case 2 had severe camptocormia which is unusual for PSP.^{1,2,10} Thus, this condition might be the result of methamphetamine abuse, or abusing Meth caused some atypical features in them.

Even though the exact underlying pathogenesis mechanisms are not clear, it is possible that Meth abuse in humans may have the same effect as mice and may increase the intracellular aggregation of α -syn and tau proteins, which, respectively, leads to synucleinopathies (the credible cause for MSA) and tauopathies (the probable reason for PSP), and cause neurodegeneration.^{1,2} However, more studies are required to confirm this hypothesis.

ACKNOWLEDGMENTS

This article is taken from disease registry, titled "Parkinson's Disease Registry in Patients Referred to Neurology Clinics of Shahid Beheshti University of Medical Sciences in Tehran (SBMU-PDR)" and code number "IR.SBMU.RETECH.REC.1398.439" from ethic committee that was supported by deputy of research and technology in Shahid Beheshti University of Medical Sciences (<http://dregistry.sbm.ac.ir>).

CONFLICT OF INTEREST

The authors do not have any conflict of interest.

AUTHOR CONTRIBUTIONS

MS involved in conception, organization, and execution of the research project, and review and critique of the manuscript. FH involved in writing of the first draft of the manuscript. RR performed review and critique of the manuscript. ME involved in research project execution and review and critique of the manuscript.

ETHICAL APPROVAL

The study was approved by ethical committee of Shahid Beheshti Medical University (IR. SBMU. RETECH.1398.439).

CONSENT


We hereby confirm that the present study confirms to the ethical standards and guidelines of the journal. The patient has given written and informed consent for online publication of his videos.

DATA AVAILABILITY STATEMENT

The data are available on request.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

How to cite this article: Salari M, Hojjati Pour F, Rashedi R, Etemadifar M. Atypical Parkinsonism: Methamphetamine may play a role. *Clin Case Rep*. 2022;10:e05808. doi:10.1002/ccr3.5808