Case Report

Evaluating Pharmacologic Interventions in Multiple System Atrophy with Predominant Parkinsonism: A Case Report

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Submission Date: 12-10-2024; Revision Date: 14-11-2024; Accepted Date: 16-12-2024.

ABSTRACT

Multiple System Atrophy (MSA) is a rare, progressive neurological disorder, more common in men, with an incidence of 0.1-3.0 per 100,000, typically emerging in people aged 50 to 60. The cause remains unknown and its pathology is marked by glial cytoplasmic inclusions and degeneration of the striatum and olivopontocerebellar regions. Multiple System Atrophy (MSA) can include symptoms such as problems with blood pressure control, movement, balance and coordination. MSA is often classified into two main types: MSA-P, primarily affecting movement and causing Parkinson's-like symptoms and MSA-C, primarily affecting balance and coordination. A 78-year-old man with an underactive thyroid gland experienced a decline in cognitive function, difficulty controlling bladder function and movement problems such as slowness, shaking and falls. MRI findings of brain atrophy, gliosis and reduced blood flow supported an MSA-P diagnosis. Levodopa and other Parkinson's medications were ineffective, indicating MSA-P's poor response to dopaminergic treatment. Diagnosis and Management: MSA-P often mimics Parkinson's disease but progresses more rapidly, shows poor levodopa response and presents with unique MRI markers. Enhanced diagnostic criteria and tools are needed, especially early in the disease. Treatments may ease symptoms but do not alter disease progression. Given the complexity of MSA-P and its severe prognosis (average survival <10 years), multidisciplinary management is essential for symptom control and quality of life improvement.

Keywords: Levodopa, Multiple Systemic Atrophy, Neurodegeneration, Parkinsonian.

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INTRODUCTION

Multiple System Atrophy (MSA) is a rare progressive neurological condition that typically affects adults and is more prevalent in men, with a male-to-female ratio of 1.3:1. MSA is sometimes overlooked during clinical examinations due to its rarity, with an annual incidence ranging from 0.1-3.0 per 100,000 depending on age and geography. The onset of the condition usually occurs in older adult age of 50s to 60s.[1] The specific cause of MSA is yet unknown. The disease is characterised by autonomic dysfunction, parkinsonian features and cerebellar or pyramidal symptoms. The pathology is characterized by glial cytoplasmic inclusions and neuronal loss, mainly involving the striatum and olivopontocerebellar systems. From a clinical standpoint, MSA is classified into distinct subtypes. The Parkinsonian variant, or MSA-P, is predominantly characterized by Parkinsonism. Neurologically, MSA-P is specifically associated with discoloration and atrophy of the posterolateral putamen.

The symptoms of MSA-C occur mainly by cerebellar ataxia. Symptoms of MSA-P resemble those associated with Parkinson's disease; they include such characteristics as bradykinesia, rigidity and postural instability. Symptoms of MSA-P mainly affect the basal ganglia and are generally reported to start off mirroring

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DOI: 10.5530/ajbls.2024.13.107

symptoms related to Parkinson's.[2] Nevertheless, patients diagnosed with MSA-P usually turn out less responsive to dopaminergic treatments, like levodopa and severe problems occur with the autonomic features which include orthostatic hypotension, disruption in sleep patterns and problems with the bladder system.

While MRI imaging, especially of the putamen, is useful in diagnosing MSA, diagnosis based on MRI finding may shows abnormalities on the conventional 1.5T MRI include atrophy of the lower brainstem, middle cerebellar peducles, cerebellum and pons. even with high-field 3T scanners the diagnosis remains challenging. The approach for diagnosis essentially depends on identifying symptoms, particularly at an early disease stage and may present a challenge for the correct diagnosis.[3] Findings from research indicate that the spectrum of symptoms of MSA is wider, which would lead to increased risk of being misdiagnosed or underdiagnosed. The study highlights the significance of tremor characteristics in differentiating between Parkinson's Disease (PD) and Multiple System Atrophy (MSA). Specifically, the dominant tremor frequency and its type (resting, postural, or action) were found to be valuable diagnostic markers. Notably, the research introduced a novel finding: harmonic patterns in tremor activity can reliably distinguish between the two conditions. In line with previous studies, MSA patients were observed to have significantly higher tremor frequencies than PD patients, regardless of their state. Additionally, resting tremors were less prevalent in MSA patients compared to PD patients.[4]we aimed to determine whether tremor characteristics can serve as novel markers for distinguishing the two conditions. Methods: Ninety-one subjects with clinically diagnosed PD and 93 subjects with MSA were included. Tremor of the limbs was measured in different conditions (such as resting, postural, and weight-holding The diagnostic criteria therefore must be updated, especially with the research into potential disease-modifying treatments. Current drugs can alleviate some symptoms but effective treatments for cerebellar symptoms remain unavailable and thus underlines the need for better diagnostic tools and therapeutic approaches. Physicians must get a more thorough understanding of early detection and prevention since neurodegenerative disorders have a significant influence on patients. This knowledge will help them improve the quality of life for affected patients.

CASE REPORT

A 78-year-old man with a history of underactive thyroid presented with increasing difficulty walking, including slowness of movement, tremors at rest, a shuffling gait and frequent falls. Additionally, He exhibited significant cognitive decline, such as problems with short-term, recent and long-term memory. The patient had trouble understanding speech and recognizing familiar faces. He also experienced urinary incontinence.

An MRI scan revealed several abnormalities, including small bleeds in the right parietal lobe, old, small areas of tissue death (infarcts) in the basal ganglia region, scarring (gliosis) in the left frontal lobe and widespread brain atrophy. The scan also showed signs of reduced blood flow to the brain, particularly in the white matter. (Figures 1 and 2).

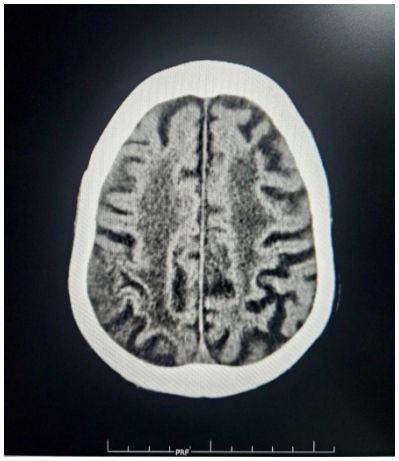

Figure 1: Magnetic resonance imaging of a man patient aged 78. On T2/FLAIR imaging, extensive periventricular hyperintense regions were also observed, which may indicate small vessel alterations. They describe gliotic alterations in the left upper frontal lobe.

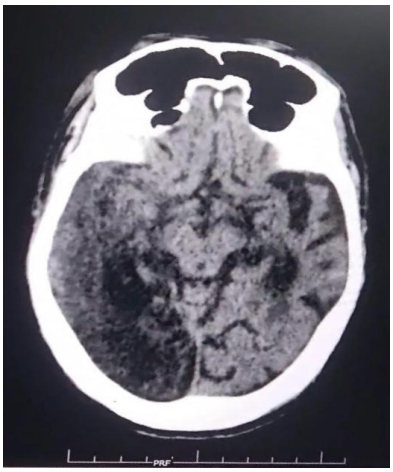

Figure 2: A well-defined hypodesion lesion with loss of grey-white distinction was observed in the right posterior parietal, temporal and occipital lobes.

The combination of Parkinson's-like symptoms (slow movement, tremors, gait problems, falls), cognitive decline and urinary incontinence strongly suggests a

diagnosis of Multiple System Atrophy, a neurodegenerative disorder. The MRI findings of brain atrophy, reduced blood flow and tissue damage further support this diagnosis.

While the patient was treated with medications for Parkinson's disease, levodopa and antibiotics, as well as medications for other conditions like thyroid hormone and blood pressure, the symptoms persisted. This indicates that levodopa, a medication commonly used for Parkinson's disease, is not effective in treating Multiple System Atrophy.

Upon discharge, the patient was prescribed various medications, including vitamins, piracetam (a medication used to improve cognitive function), serratiopeptidase (an enzyme used to reduce inflammation) and ropinirole (a medication used to treat Parkinson's disease).

DISCUSSION

In this instance, Multiple System Atrophy of the Parkinsonian subtype (MSA-P), which is defined by a progressive decline in motor, cognitive and autonomic capacities, has developed in a 78-year-old man with a history of hypothyroidism. Apart from cognitive impairment and autonomic symptoms including urine incontinence, MSA-P often presents clinically as parkinsonian traits such bradykinesia, short-stepping gait and resting tremors that are similar to those of Parkinson's Disease (PD). The patient experienced autonomic symptoms affecting both urinary function and posture. Urinary symptoms included frequent urination both during the day and night, a strong urge to urinate, accidental leakage of urine, difficulty starting or stopping urination and incomplete emptying of the bladder.[4] However, MSA-P often advances faster, reacts poorly to levodopa and is associated with a greater variety of neurodegenerative changes than Parkinson's Disease (PD). Among the patient's typical parkinsonian motor symptoms were bradykinesia, tremors and a history of recurrent falls.[5] Notably, his condition was not improved by the typical Parkinson's disease therapies levodopa and carbidopa. Levodopa resistance is one feature that distinguishes MSA-P from Parkinson's Disease (PD), where levodopa usually alleviates symptoms.[6] This patient experienced severe memory loss, recognition and comprehension issues, which is consistent with MSA-P-related neurodegeneration in the cortical and subcortical structures, even though MSA-P usually results in less severe cognitive impairment than other neurodegenerative diseases like Alzheimer's disease. Gliosis, signs of small artery ischemic changes and mild to moderate brain shrinkage are MRI findings that support this diagnosis. Similar MRI finding were observed in an another case report by Mori K *et al*.[7] These findings also align with a pattern of small vessel ischemia, which often makes MSA's motor and cognitive impairments worse. Autopsy studies have revealed that dementia and mild cognitive dysfunction are common in individuals diagnosed with MSA. Recent research further supports this, showing that dementia occurs in up to 31% of MSA cases. This evidence highlights that the presence of dementia alone cannot eliminate the possibility of an MSA diagnosis. The patient's urinary incontinence suggests autonomic dysfunction, a characteristic feature of Multiple System Atrophy (MSA). This finding aligns with a previous case report by Jing Guo *et al*.[8] where a patient with MSA also experienced long-term constipation. The fact that autonomic symptoms are more common in MSA-P and less common in idiopathic Parkinson's disease lends greater credence to this diagnosis.[8] Both vascular and degenerative elements of the disease process were indicated by the MRI, which also showed periventricular hyperintense areas, lacunar infarcts, gliotic changes and widespread brain atrophy. Significant white matter hypodensities and hypodense lesions were also visible in the CT scan data, which is in line with extensive white matter degeneration. Both imaging modalities support MSA-P's hallmark of multiple brain system degeneration.[9] Levodopa/carbidopa, antibiotics, pantoprazole, thyroxine and other supportive drugs were used to treat the patient while they were in the hospital. However, motor symptoms continued because MSA-P is levodopa-resistant, underscoring the difficulty of managing symptoms in MSA. Piracetam and ropinirole, which may aid with cognitive and motor symptoms, were among the discharge drugs. However, because MSA is progressive, symptom control is still limited. Treating MSA is challenging as there's no treatment that can slow or stop the disease's progression. Current therapies focus solely on managing symptoms. Unfortunately, the average lifespan after diagnosis is less than ten years.[10]

CONCLUSION

Clinical and diagnostic complexities of this case appear in the clinical picture of Multiple System Atrophy of the Parkinsonian type, MSA-P. The MSA-P reflects a progressive impairment in the functions of the motor, cognitive and autonomic levels. In diagnosing this condition, its confusion sometimes occurs with the Parkinson's disease, where these have similar symptoms but its difference are rapid progression and lesser response to levodopa with evident neurodegenerative changes. The MRI findings with clinical observation

of autonomic symptoms like urinary incontinence also support the diagnosis. Current treatments are useful in the management of the symptoms but cannot halt the disease process. Therefore, a multidisciplinary approach continues to be important in dealing with the broad spectrum of symptoms in MSA-P patients for improvement in quality of life.

ACKNOWLEDGEMENT

We would like to express our gratitude to Dr. Sai Keerthana P. C. and the medical staff at KIMS Al Shifa Hospital for their valuable insights into Multiple System Atrophy, Parkinsonian type (MSA-P). Their expertise significantly enhanced this evaluation. We also express our gratitude to our families, friends and the professors at Al Shifa College of Pharmacy for their support throughout this process.

CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest regarding the publication of this case report.

ABBREVIATIONS

MSA-P: Multiple system atrophy-Parkinsonian; **MRI:** Magnetic resonance imaging; **MSAC:** Multiple system atrophy-Cerebellar; **PD:** Parkinson's disease; **CT:** computer tomography.

SUMMARY

The clinical presentation is strongly suggestive of rare Multiple System Atrophy, Parkinsonian Subtype (MSA-P). It is a progressive degeneration of neurodegeneration with decline in motor, cognitive and autonomic functions. MSA-P has many the same motor symptoms of Parkinson's Disease (PD) and may be mistaken as such. However, in these patients, diagnosis needs to be sharpened because patients with MSA-P generally have faster progression, poor response to levodopa and poor prognosis. Various researches are conducted on distinguishing MSA-P and PD. Applying the Sniffin Sticks test would be one way of distinguishing between the two conditions. In the patient's case, rapid onset of symptoms, poor response to levodopa and typical MRI findings align toward the diagnosis of MSA-P. Despite treatment, continuing motor symptoms highlight some challenges in management of complex disease. While such drugs as ropinirole and piracetam offer some support, a multimodal approach is also needed to optimize the quality of life in patients with MSA-P.

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Cite this article: Cheruvatta SKP, Pattambi MA, Koppara MI, Simon P, Rajagopalan NS, Sabith A, Evaluating Pharmacologic Interventions in Multiple System Atrophy with Predominant Parkinsonism: A Case Report. Asian J Biol Life Sci. 2024;13(3):890-3.