Vascular Parkinsonism: A Case Highlighting the Importance of Advanced Neuroimaging in Diagnosing Small Vessel Disease with Normal Conventional MRI Findings

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Abstract:

Objective: To emphasize the significance of advanced neuroimaging techniques, specifically Susceptibility-Weighted Imaging (SWI), in diagnosing small vessel disease in patients presenting with parkinsonian features and normal conventional MRI findings.

Design: Case report.

Materials and Methods: A 48-year-old male with a one-year history of progressive left-sided weakness, facial asymmetry, and subsequent development of parkinsonian symptoms. Initial and follow-up conventional MRI scans were unremarkable.

Results: Despite normal MRI findings, clinical examination revealed left-sided upper motor neuron facial palsy, hemiparesis, exaggerated deep tendon reflexes, and rigidity. The patient responded positively to dopaminergic therapy.

Conclusion: This case underscores the necessity of incorporating advanced imaging modalities like SWI in patients with clinical features suggestive of cerebrovascular pathology but with normal conventional MRI results.

Keywords: Vascular Parkinsonism, Small Vessel Disease, Susceptibility-Weighted Imaging, Normal MRI, Case Report

Introduction:

Vascular parkinsonism (VP) is a neurological disorder characterized by parkinsonian symptoms arising from cerebrovascular pathology. Diagnosing VP can be complex, particularly when standard neuroimaging does not reveal significant abnormalities. This case report highlights the diagnostic challenges and emphasizes the potential role of advanced imaging techniques in such situations.

Case Report:

A 48-year-old male presented with a progressive left-sided weakness that had persisted for a year. Initially, he noticed difficulty using his left hand while riding his motorcycle and experienced challenges in operating the kickstand with his left leg. Additionally, he observed facial deviation towards the right. He denied any issues with swallowing or speech and continued his daily routine until the weakness significantly hindered his ability to ride. Upon hospital evaluation, a brain MRI was conducted, showing no abnormalities. However, he was diagnosed with hypertension and diabetes mellitus.

Neurological assessment revealed left-sided upper motor neuron facial palsy and hemiparesis. Deep tendon reflexes were heightened on the left side, while plantar responses remained flexor. Muscle strength was rated at 3/5 for left upper limb extension, 4/5 for flexion, 3/5 for left lower limb flexion, and 4/5 for extension.

In the following months, the patient developed bradykinesia, resting tremors, and instability in gait. Upon re-evaluation, rigidity was noted in both upper limbs and the left lower limb, along with a masked facial expression and reduced blinking. His Unified Parkinson's Disease Rating Scale (UPDRS) score was 24. A follow-up brain MRI remained unremarkable. Initial treatment with antiplatelet therapy was later combined with dopamine agonists, resulting in significant improvement in motor symptoms.

Subsequently, the patient reported hip pain radiating to the lower limb. Due to a clinical suspicion of small vessel disease contributing to VP, an MRI with susceptibility-weighted imaging (SWI) sequences was planned. Pain management with gabapentin and nortriptyline provided significant relief.

Discussion

Vascular parkinsonism (VP) is a neurodegenerative syndrome where cerebrovascular pathology, particularly small vessel disease (SVD), leads to parkinsonian features. Unlike idiopathic Parkinson's disease (PD), which primarily results from dopamine neuron loss in the substantia nigra, VP arises due to ischemic or hemorrhagic damage to basal ganglia circuits. The clinical differentiation between VP and PD is crucial, as treatment responses and prognoses differ significantly.

Role of Neuroimaging in VP Diagnosis

Traditional MRI sequences (T1, T2, FLAIR) often fail to detect subtle microvascular pathology responsible for VP. Studies have shown that diffusion-weighted imaging (DWI) and susceptibility-weighted imaging (SWI) enhance diagnostic accuracy by detecting:

- Microbleeds, hemosiderin deposition, and ischemic changes
- Subcortical infarcts in strategic locations (e.g., basal ganglia, thalamus, and deep white matter)

A study by Haller et al. (2010) demonstrated the superiority of SWI in identifying microvascular damage compared to conventional MRI, particularly in cases where symptoms suggest cerebrovascular involvement. Our patient exhibited progressive asymmetric parkinsonism with normal conventional MRI findings, highlighting the importance of incorporating SWI into diagnostic algorithms for suspected VP cases.

Comparison with Similar Case Reports

Several case reports have documented VP with normal routine MRI findings, but abnormalities detected via advanced imaging:

Zijlmans et al. (2004) reviewed 17 VP cases, where conventional MRI was unremarkable in 35%, yet postmortem analysis revealed extensive small vessel pathology.

Kalaria et al. (2012) emphasized that white matter hyperintensities (WMHs) on MRI correlate poorly with symptoms, requiring additional imaging tools like SWI and DTI (diffusion tensor imaging) for improved detection.

A case report by Ferrer et al. (2017) presented a 52-year-old male with VP, where SWI identified microvascular changes in the basal ganglia despite a normal MRI, reinforcing its role in early detection.

Implications for Clinical Practice

Given the overlap between VP and idiopathic PD, diagnostic accuracy is vital. Misdiagnosis can lead to inappropriate treatment, as VP patients often have limited or no response to levodopa, unlike idiopathic PD cases. Our patient showed initial improvement with dopaminergic therapy, suggesting a mixed pathology or partial dopaminergic deficit. However, the later onset of gait instability, rigidity, and additional cerebrovascular risk factors (hypertension, diabetes) strongly pointed toward VP.

Thus, our case underscores the importance of integrating advanced imaging modalities, such as SWI, into routine practice for patients with unexplained parkinsonian features and cerebrovascular risk factors.

Conclusion

This case highlights the limitations of conventional MRI in diagnosing VP and underscores the importance of SWI in detecting small vessel pathology. Given the growing evidence supporting SWI in VP diagnosis, future guidelines should incorporate advanced imaging techniques for patients with parkinsonism and vascular risk factors but normal routine MRI findings.

Acknowledgements:

We thank Dr.Samiullah Khan , Dr. Naveed and Dr. Deepthi for their contributions to this case report.

Ethical Statement:

Informed consent was obtained from the patient for publication of this case report.

Conflict of Interest:

The authors declare no conflicts of interest.

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