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Case of Progressive Multifocal Leukoencephalopathy in a HIV Positive Patient

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Abstract: ***Progressive multifocal leukoencephalopathy (PML) is an opportunistic infection of the CNS caused by the JC virus, which infects white and grey matter cells and leads to irreversible demyelination and neuroaxonal damage. Brain CT and MRI, in addition to the clinical presentation and demonstration of JC virus DNA either in the CSF or by histopathology, is an important tool in the detection of PML.***

Keywords: progressive multifocal leukoencephalopathy, magnetic resonance imaging, computed tomography

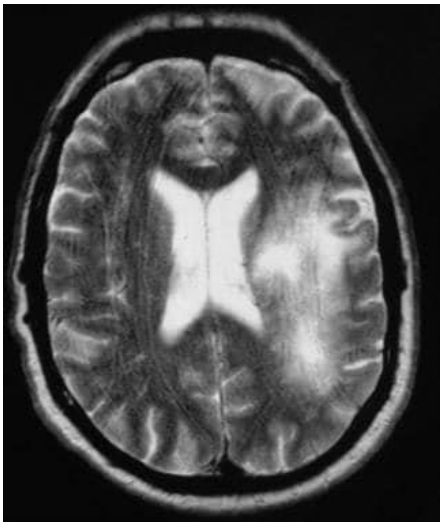
1. Introduction

Progressive multifocal leukoencephalopathy (PML) is a fatal subacute progressive demyelinating disease caused by the neurotrophic JC polyoma virus. Before the HIV epidemic, PML was rare and associated with other immunocompromised conditions, such as leukaemia, lymphoma, systemic lupus erythematosus (SLE), organ transplantation, Wiskott - Aldrich syndrome, and severe combined immunodeficiency (SCID). During the first 2 decades of the HIV epidemic, PML was predominantly seen in patients with AIDS, but effective antiretroviral treatment and restitution of T cell function led to a decline in the occurrence of PML in this population. The advent of drugs that interfere with leukocyte - endothelial interaction, such as natalizumab for multiple sclerosis (MS) and efalizumab for psoriasis, has led to an increase in the number of cases of PML. Other immunosuppressive agents associated with PML include rituximab, brentuximab - vedotin (BV), alemtuzumab, eculizumab, infliximab, adalimumab, fumaric acid esters (FAE), dimethyl fumarate (DMF), fingolimod, and ibrutinib.

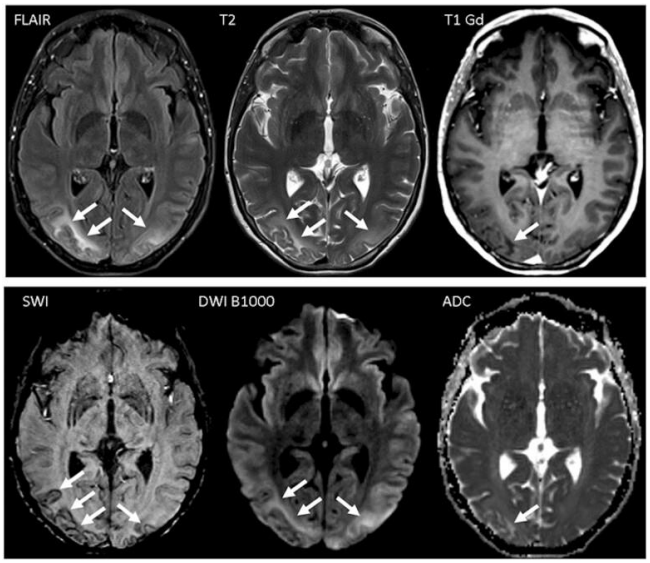
PML - related immune reconstitution inflammatory syndrome (IRIS) was originally described in patients with AIDS who paradoxically deteriorated on starting highly active antiretroviral therapy. It is also a recognized complication following natalizumab cessation in patients with MS.

Imaging reveals characteristic multiple lesions in the subcortical hemispheric white matter or the cerebellar peduncles. PML lesions also occur in gray - matter areas such as the basal ganglia or thalamus.

The characteristics of PML, as seen on magnetic resonance imaging (MRI) and computed tomography (CT) scans, are demonstrated below.



T2 - weighted MRI in a patient infected with HIV demonstrates a hyperintense lesion in the left frontoparietal region in the subcortical and periventricular white matter. Biopsy confirmed progressive multifocal leukodystrophy.



Imaging findings of PML on multisequence MRI. Axial brain MRI images of a patient presenting with PML lesions in bilateral occipital lobes, primarily in the subcortical white matter and adjacent cortical grey matter. These images are consistent with a classic MRI pattern of PML, with high signal intensity on T_2 - weighted images and DWI, and low signal intensity on the contrast - enhanced T_1 - weighted images (arrows). On SWI, bands of low signal intensity adjacent to cortical grey matter can be observed, suggesting deposition of paramagnetic compounds such as iron

2. Case Report

A 52 - year - old male patient presented to the casualty with complaints of **right sided upper limb and lower limb weakness with slurring of speech.**

Past history:

- **Retroviral disease (HIV) Positive status since 9 months**
- **Recurrent CVA**
- Hypertension and Diabetes Mellitus since 1 year.

Personal history: Known smoker since 25 years.

- On admission:

Vitals: BP: 110/80 mm Hg
Pulse: 64 bpm
Respiratory rate: 18/ min

GCS: E2V3M5

a) CSF culture and sensitivity was sent which was **positive for Human Polyoma virus 2/ JC Virus**
b) **Absolute CD4 count: 267.06**
c) Radiological Workup:
   - CT Brain Plain and MRI Brain plain was done.

CT Brain Plain

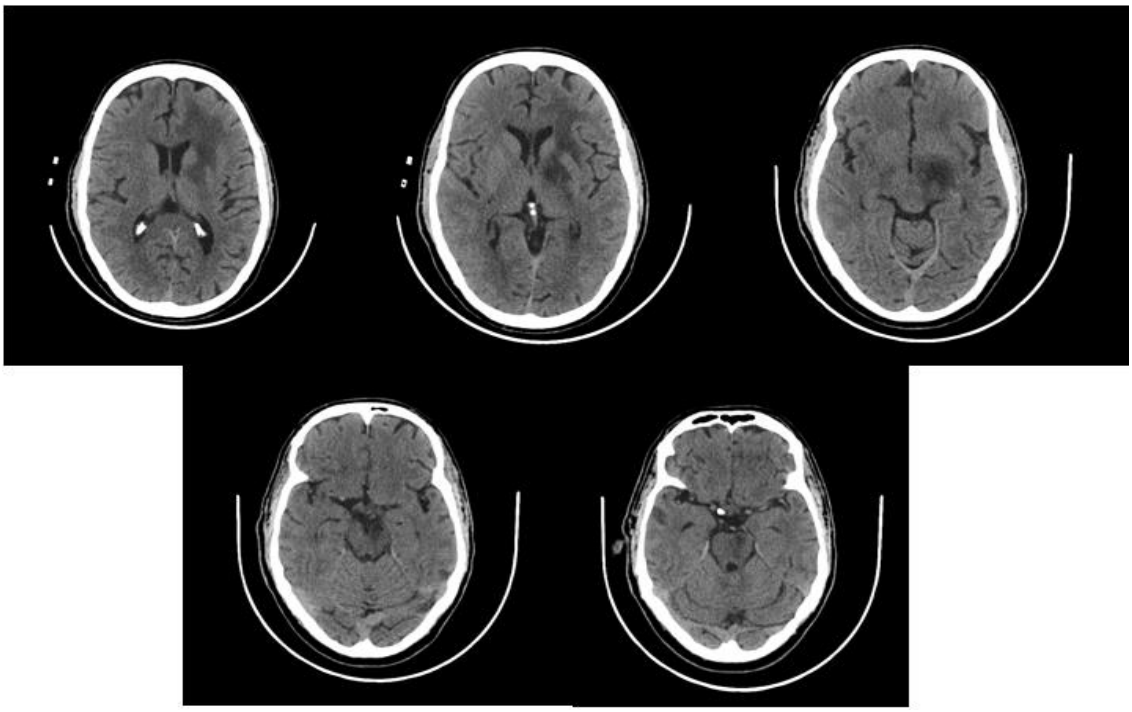


Figure 1: Ill - defined hypodense areas are noted involving the subcortical white matter of the left frontal lobe, left corona radiata, anterior limb, genu and posterior limb of the left internal capsule, left thalamus, left cerebral peduncle, left half of the midbrain and left hemipons. Correlating with clinical history of HIV positive status, Possible radiological differentials include:

1) Acute non - hemorrhagic infarct.
2) Progressive multifocal leukoencephalopathy.

Advice: MRI Brain for further evaluation.

MRI BRAIN PLAIN

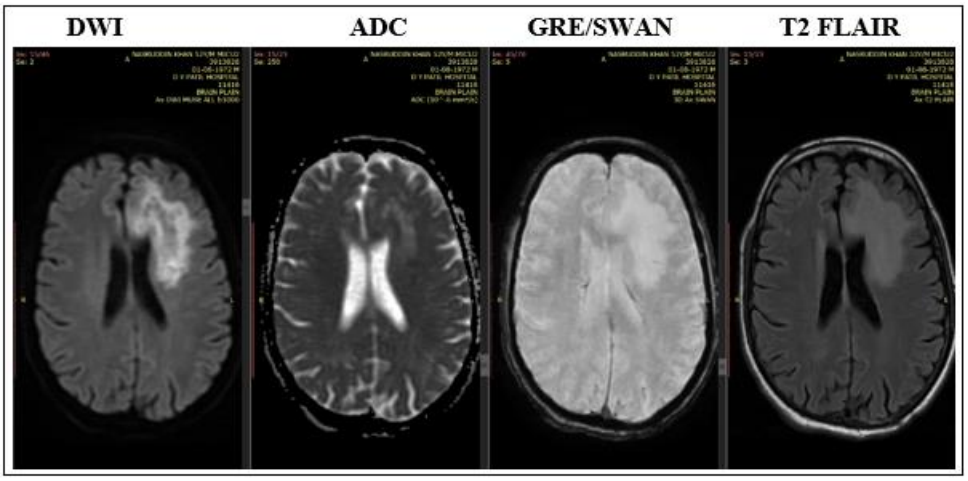


Figure 2: Well defined, discrete and confluent areas of CSF intensity with adjacent FLAIR hyperintense rim is noted involving the of the right thalamo - capsular, right temporal lobe, bilateral cerebral peduncle, subcortical white matter of the left frontal lobe, left corona radiata, left parietal lobe, left internal capsule, left lentiform nucleus bilateral thalamus, bilateral middle cerebellar peduncle, left half of the midbrain and pons with prominence of the adjacent cortical sulci. Few of these areas in the left frontal lobe and left internal capsule appear hyperintense on diffusion weighted images with subtle drop on ADC images. No blooming is noted on gradient images. Correlating with clinical history of HIV positive status, findings are most likely suggestive of Progressive Multifocal Leukoencephalopathy. Advice: CD4+ cell count correlation.

3. Conclusion

Based on the abovementioned imaging features, the possible radiological diagnosis was Progressive Multifocal Leukoencephalopathy.

Other radiological differentials include:

- New demyelinating lesions in patients with multiple sclerosis
- HIV/AIDS encephalopathy
- Posterior Reversible Encephalopathy Syndrome (PRES)
- Acute Disseminated Encephalomyelitis (ADEM)
- Immunodeficiency - Associated CNS Lymphoma

4. Discussion

There was presentation of **right sided upper limb and lower limb weakness with slurring of speech in a HIV positive patient with past history of recurrent CVA.** The GCS at presentation was E2V3M5 which continued to drop progressively. The last calculated GCS was E2V1M1. **CT Brain** was suggestive of **Progressive Multifocal Leukoencephalopathy v/s Acute non - hemorrhagic infarct**. **CSF analysis** was sent which was **positive for JC Virus.** Following which **MRI Brain Plain** was done which was conclusive for **Progressive Multifocal Leukoencephalopathy**. CD4+ counts was sent which was 267. There was progressive deterioration in symptoms and drop in GCS.

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