FOCAL NEUROLOGICAL DEFICIT in HIV PATIENTS
-a case based approach

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Case 1

- Middle aged gentleman
- Diagnosed to have HIV 5 months prior to admission
- CD4 at the time of detection: 132
- Initiated on ART (Tenofovir based) and Septran
- Initiated on ATT for Abdominal tuberculosis 2 months later
• Presented with features suggestive of intestinal obstruction
• CT Abdomen - small gut obstruction with stricture in pelvic mesentery
• Laparotomy - multiple bands in distal ileum
• Biopsy - chronic ileitis and stricture
History of left side weakness for 5 months

Clinical examination

- Left facial weakness
- Left hemiparesis
- Left cerebellar signs
Case 2

- 46 years old male PLHIV for 3yrs ART naïve
- CD4 at diagnosis-387
- Presented with
  - Slurring of speech for 1 month
  - Right upper limb weakness for 10 days
- PMH: Herpes zoster 1 year ago
Clinical examination

- Oral Candidiasis
- Cervical and axillary lymph nodes
- Right upper limb mono paresis (power 3/5)
- Brisk DTR on the right side

- CD4 136
Case 3

- Middle aged lady
- headache and vertigo for 1 month
- detected to be HIV infected on admission
- CD4 160
Clinical examination

- Oral candidiasis
- Higher functions – normal
- Cranial nerves- Normal
- Power- Normal
- DTR- Brisk with flexor plantar.
- Ataxia
How do we approach?

- Case 1- Left facial weakness/Left hemiparesis/Left cerebellar signs
- Case 2- Right upper limb monoparesis
- Case 3- Ataxia
## Focal neurological deficit in PLHIV

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Clinical Features</th>
<th>Etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal cerebral lesions</td>
<td>Headache</td>
<td>Cerebral toxoplasmosis</td>
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<tr>
<td></td>
<td>Focal neurological deficits</td>
<td>Tuberculoma</td>
</tr>
<tr>
<td></td>
<td>(hemiplegia, hemianopia)</td>
<td>Primary CNS lymphoma</td>
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<tr>
<td></td>
<td>Seizures</td>
<td>Neurocysticercosis</td>
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<tr>
<td></td>
<td></td>
<td>PMLE</td>
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<tr>
<td></td>
<td></td>
<td>Cryptococcma</td>
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<tr>
<td></td>
<td></td>
<td>Brain Abscess</td>
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<tr>
<td></td>
<td></td>
<td>Stroke</td>
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</tbody>
</table>
Toxoplasmosis

- Leading cause of focal CNS lesion in HIV
- Reactivation of chronic infection
- Definitive Diagnosis
  - compatible clinical findings
  - Imaging
    - Detection of T.gondi in clinical sample
- Toxoplasma to be considered
  - compatible clinical findings
  - CT scan/MRI brain
  - Toxo IgG positive
  - CD4<100
  - Clinical response to treatment
Primary CNS lymphoma

- Incidence increasing in the era of ART
- MRI lesions with negative serology
- MR spectroscopy and PET
- EBV in CSF
Tuberculoma

- CNS TB -10% of AIDS related tuberculosis
- Clinical evidence of TB elsewhere
- Tuberculomas
  - cerebrum, cerebellum, subarachnoid space, subdural space, or epidural space.
  - Less edema
- Associated features
  - Leptomeningeal enhancement
  - Hydrocephalus
  - Cerebral infarct
  - CSF study- compatible with Tb
<table>
<thead>
<tr>
<th></th>
<th>Toxoplasmosis</th>
<th>Primary CNS Lymphoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence</td>
<td>common</td>
<td>Less common</td>
</tr>
<tr>
<td>Number of lesions</td>
<td>Multiple lesions</td>
<td>Multiplicity less common</td>
</tr>
<tr>
<td>Area involved</td>
<td>Basal ganglia and substantia nigra</td>
<td>Periventricular /corpus collosum. Deep grey and white matter</td>
</tr>
<tr>
<td>Edema</td>
<td>Disproportionate edema</td>
<td>Less edema</td>
</tr>
<tr>
<td>MRI Spectroscopy</td>
<td>Increased lactate and lipid peak</td>
<td>Increased lactate and lipid peak</td>
</tr>
<tr>
<td></td>
<td>Other metabolites are absent</td>
<td>Increased choline peak</td>
</tr>
<tr>
<td></td>
<td>Greater values of diffusion- coefficient</td>
<td>decreased N-acetyl aspartate,myoinositol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low diffusion-coefficient values</td>
</tr>
<tr>
<td>PET (Fluro-2-deoxyglucose)</td>
<td>Decreased glucose metabolism</td>
<td>Increased glucose metabolism</td>
</tr>
<tr>
<td>201 Thal SPECT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Toxoplasmosis versus Tuberculoma

### Toxoplasma
- Common incidence
- Multiple lesions >3
- Basal ganglia and substantia nigra
- Disproportionate edema
- Toxo IgG

### Tuberculoma
- Common incidence
- Single or multiple lesions
- Infratentorial lesion
- Less edema
- Leptomeningeal enhancement/hydrocephalus/cerebral infarct
- PCR
Neurocysticercosis

- Considered in endemic areas
- MRI lesions with high CD4 count
- Scolex visualised on MRI
- Serology
Brain Abscess

- Toxoplasma
- Listeria.monocytogenes
- Mycobacterium tuberculosis
- Cryptococcus.neoformans
- Histoplasma.capsulatum
- Aspergillus
- Nocardia
Progressive Multifocal Leukoencephalopathy

MRI Brain
- Non-enhancing white matter lesions
- Asymmetric, Multifocal
- No cerebral edema
- No mass effect
- Peri-ventricular and sub-cortical involvement.

CSF study
- PCR for JC virus DNA in CSF is usually positive.
PML vs HIV encephalopathy

PML

Encephalopathy
Stroke in HIV
Cardiac

- Nonbacterial thrombotic endocarditis,
- Infective endocarditis (injection drug use)
- HIV myocarditis with thrombus
Vascular (vasculitis/vasculopathy)

- Cytomegalovirus
- Varicella-zoster virus
- Herpes simplex virus
- Mycobacterium tuberculosis
- Syphilis
- Cryptococcosis
- Mucormycosis
- Aspergillosis
- Candida albicans
- Coccidioidomycosis
- Toxoplasmosis
- Trypanosomiasis

- HIV vasculopathy
- vasculitis (eosinophilic, necrotizing, granulomatous)
Abnormalities of coagulation

- Protein S deficiency
- Antiphospholipid antibodies
- Disseminated intravascular coagulation
Case 1

MRI brain- nodular enhancing foci in B/L cerebral and cerebellar hemispheres.

<table>
<thead>
<tr>
<th>RBC</th>
<th>WBC</th>
<th>Cryptococcal antigen</th>
<th>sugar</th>
<th>protien</th>
<th>Culture</th>
<th>Malignant cytology</th>
</tr>
</thead>
<tbody>
<tr>
<td>320mg/dl</td>
<td>nil</td>
<td>neg</td>
<td>48 mg/dl</td>
<td>50 g/dl</td>
<td>No growth</td>
<td>negative</td>
</tr>
</tbody>
</table>
• Took ATT for 9 months
• CD4- 357
• Toxo IgG- 1100IU/ml
• Initiated on treatment for cerebral toxoplasmosis
Case 2

- MRI brain- subacute infarct involving paramedian portion of midbrain, cerebral peduncle, lentiform nucleus, thalamus, internal capsule, external capsule, insular cortex and corona radiata
<table>
<thead>
<tr>
<th>WBC</th>
<th>RBC</th>
<th>Protein</th>
<th>Sugar</th>
<th>Cryptococcal antigen</th>
<th>Indian ink preparation</th>
<th>KOH smear</th>
</tr>
</thead>
<tbody>
<tr>
<td>nil</td>
<td>nil</td>
<td>32mg/dl</td>
<td>54mg/dl</td>
<td>Negative</td>
<td>Neg</td>
<td>Neg</td>
</tr>
</tbody>
</table>
Case 3

- MRI- multiple **ring enhancing lesions** in bilateral cerebral and cerebellar hemispheres with perilesional edema
- Evidence of meningeal enhancement in right parietal and b/l cerebellar convexities
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF RBC</td>
<td>Nil</td>
</tr>
<tr>
<td>WBC</td>
<td>40</td>
</tr>
<tr>
<td>Protien</td>
<td>24</td>
</tr>
<tr>
<td>Sug</td>
<td>40</td>
</tr>
<tr>
<td>Cryp Ag</td>
<td>Neg</td>
</tr>
<tr>
<td>Tbc PCR</td>
<td>Neg</td>
</tr>
</tbody>
</table>
APPROACH TO FOCAL CEREBRAL SYNDROME IN HIV INFECTION

Focal Deficit

CAT Scan / MRI

Multiple ring enhancing lesions

Toxoplasma IgG

Positive

Treat for Toxoplasmosis

Infarct

CSF examination
WBC, Protein, Sugar, ADA
Cryptococcal antigen
Indian ink preparation, bacterial, fungal, mycobacterial, VDRL

Negative

Biopsy

inconclusive

Nonenhancing lesion

PMLE

CSF

JC virus PCR

Treat for Toxoplasmosis
“My work is for a King”

Thank You