



**SEMI**

**SOCIETY FOR EMERGENCY MEDICINE INDIA**

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# VIRAL ENCEPHALITIS – EASY TO MISS

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A magnifying glass with a black frame is positioned over an open dictionary. The word 'disclosure' is prominently displayed in a large, bold, black font, centered within the lens. The background shows various dictionary entries, including 'disclaim', 'disclaimer', 'disclose', 'discolored', 'discolor', and 'natural', all in a smaller, lighter font. The word 'disclosure' is the only one that is sharp and clear, while the others are blurred.

disclosure

NONE

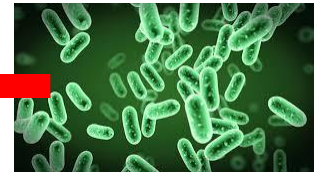
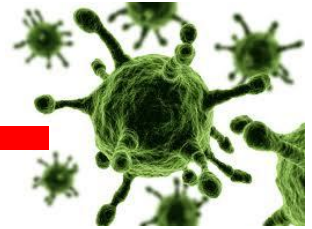
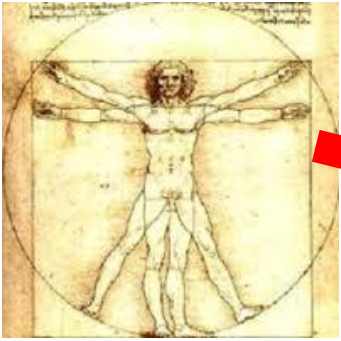




**VIRAL ENCEPHALITIS – EASY TO MISS**

**TAMORISH KOLE**  **INDIA**

# EVOLUTION OF LIFE



**VIRAL ENCEPHALITIS – EASY TO MISS**

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# VIRAL ENCEPHALITIS – EASY TO MISS



**VIRAL ENCEPHALITIS – DIFFICULT TO DIAGNOSE**



**BURDEN**

**PEARLS  
&  
PITFALLS**

# AGENDA

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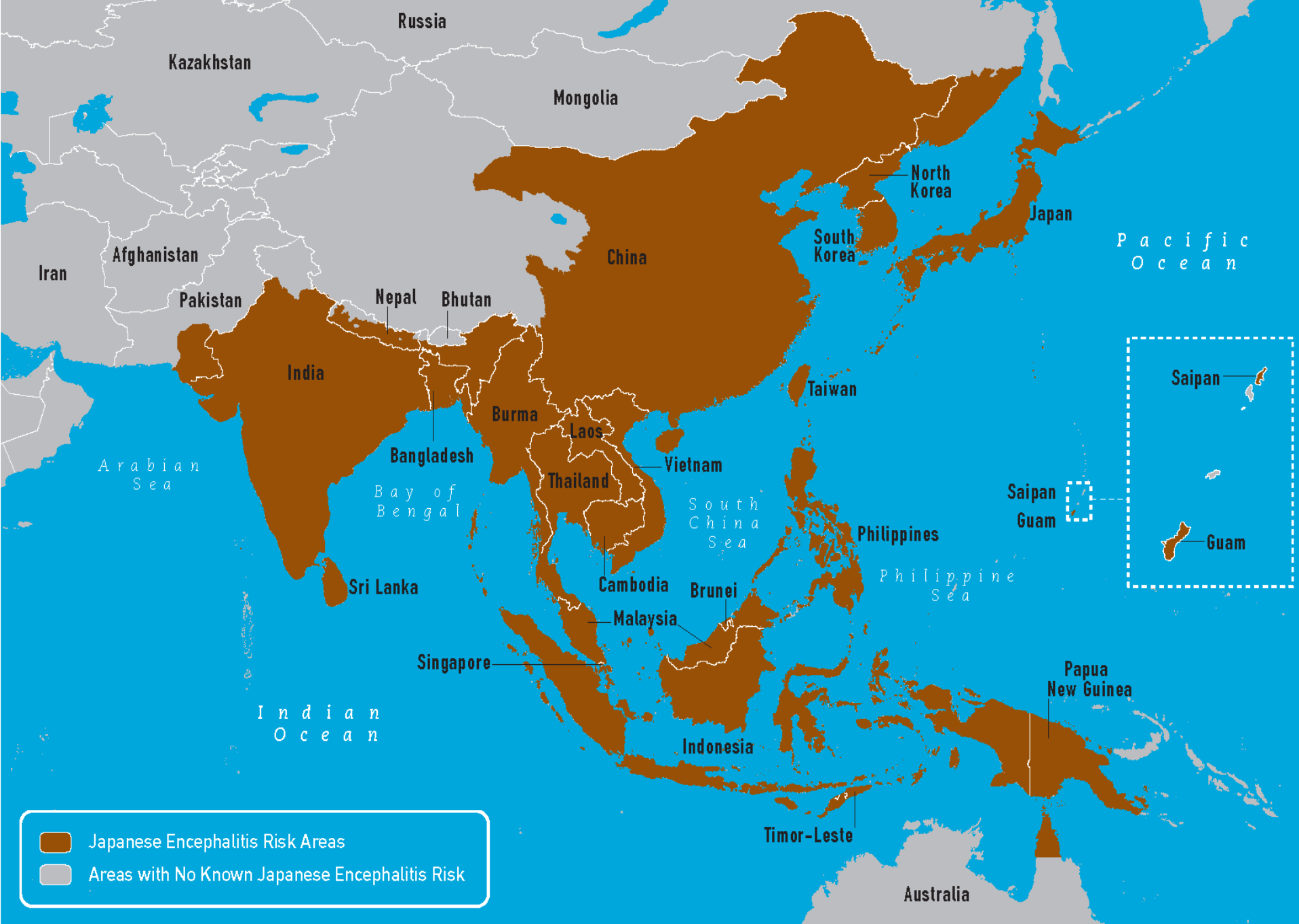
**PATTERNS  
AND  
PRESENTATIONS**

**ED  
MANAGEMENT**

**CASE STUDY**

# BURDEN OF VIRAL ENCEPHALITIS

1



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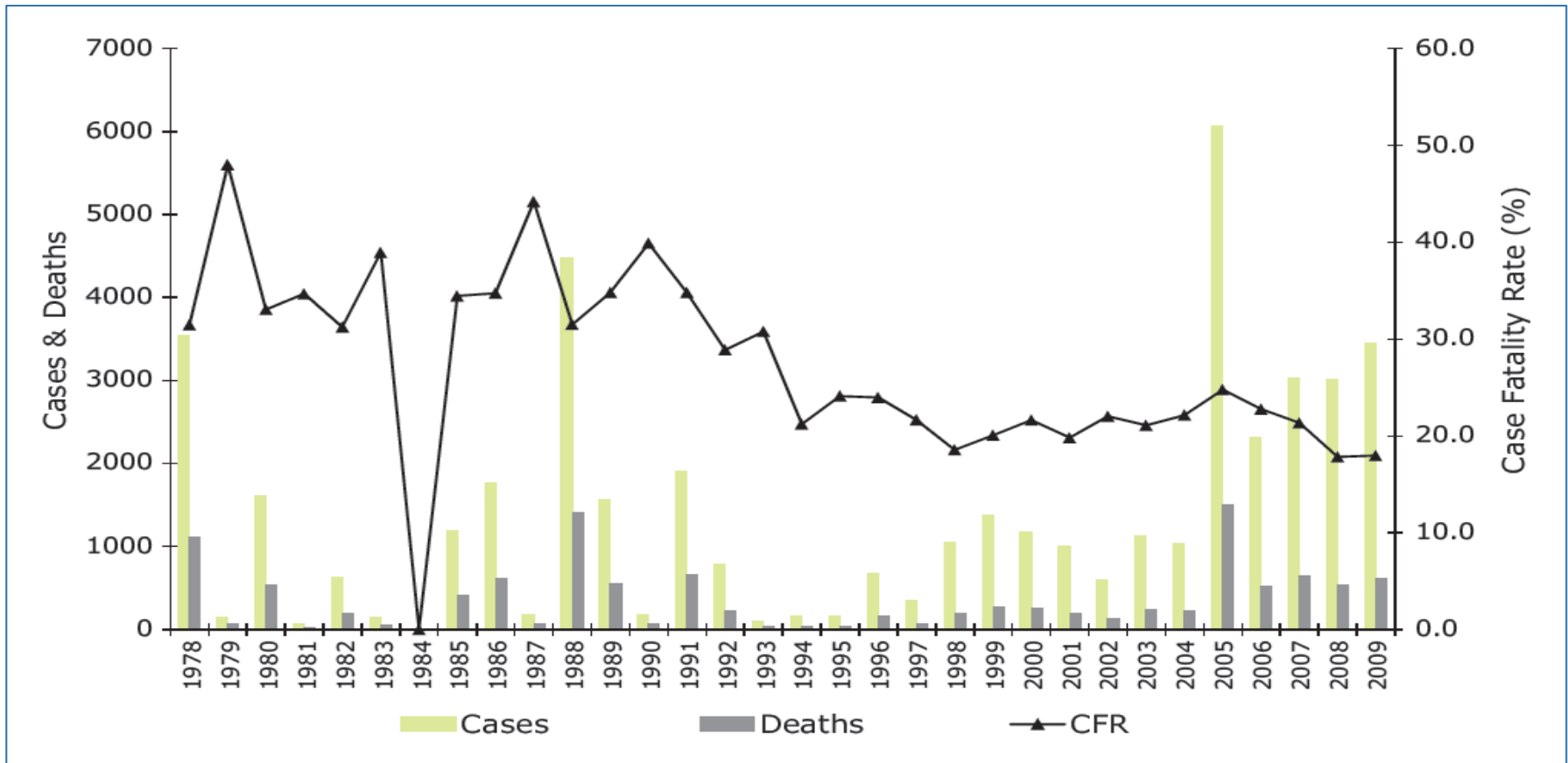
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# A review of Japanese encephalitis in Uttar Pradesh, India

Roop Kumari<sup>a</sup>, Pyare L Joshi<sup>b</sup>

*WHO South-East Asia Journal of Public Health* 2012;1(4):374-395



**Trend of suspected Japanese encephalitis: cases, deaths and case-fatality rate (%) in Uttar Pradesh, 1978–2009**

# BASICS OF VIRAL ENCEPHALITIS

# 2



## Encephalopathy

- Clinical syndrome of reduced consciousness
- Many causes, incl. viral encephalitis

## Encephalitis

- Acute, diffuse, inflammatory process affecting brain parenchyma
- Most commonly viral

## Meningitis: Meningeal inflammation

## Myelitis: Spinal cord inflammation

## Radiculitis: Nerve root inflammation

### Bacteria

#### Spirochetes

Syphilis (secondary or meningovascular)

Leptospirosis

*Borrelia burgdorferi* infection (Lyme disease)

*Mycoplasma pneumoniae* infection

Cat-scratch fever

Listeriosis

Brucellosis (particularly due to *Brucella melitensis*)

Tuberculosis

Typhoid fever

Parameningeal infections (epidural infection, petrositis)

Partially treated bacterial meningitis

Brain abscesses

Whipple's disease

### Fungi

Cryptococcosis

Coccidioidomycosis

Histoplasmosis

North American blastomycosis

Candidiasis

### Parasites

Toxoplasmosis

Cysticercosis

Echinococcosis

Trichinosis

Trypanosomiasis

*Plasmodium falciparum* infection

**INFECTIOUS DISEASES LIKE VIRAL ENCEPHALITIS**

**NON-INFECTIOUS DISEASES LIKE VIRAL ENCEPHALITIS**

CNS vasculitis

Fulminant bacterial meningitis

ADEM

Thrombotic thrombocytopenic purpura

Fulminant hepatic failure, Reyes syndrome

Endocrine crisis (e.g., myxedema, Addison's disease)

Toxic encephalopathy (e.g., cyclosporine, tacrolimus, MTX, 5-FU, illicit drugs)

## SPORADIC CAUSES: NOT GEOGRAPHICALLY RESTRICTED

### Herpes viruses

- HSV-1, HSV-2, VZV, CMV, EBV, HHV6, HHV7

### Enteroviruses

- Coxsackie, echoviruses, enteroviruses 70/71, parechovirus, poliovirus

### Paramyxoviruses

- Measles, mumps

### Others (rarer causes)

- Influenza viruses, Adenovirus, parvovirus, lymphocytic choriomeningitis virus, rubella virus, rabies

## GEOGRAPHICALLY RESTRICTED CAUSES

### Arboviruses

- Japanese B, St Louis, West Nile, Eastern equine, Western equine, Venezuelan equine, tick borne encephalitis viruses

### Bunyaviruses

- La Crosse strain of California virus

### Reoviruses

- Colorado tick fever virus



## Depends on the virus

- direct viral destruction of cells
- Para or post-infectious inflammatory or immune-mediated response

Most viruses  
primarily infect  
brain parenchyma  
and neuronal cells

Some cause a  
vasculitis

Demyelination may  
follow infection

# VIRAL ENCEPHALITIS: ED PRESENTATIONS

3



# VIRAL ENCEPHALITIS – ED PRESENTATIONS

## Typical presentation

- Acute flu-like prodrome
- High fever, severe headache, N&V
- Altered consciousness (lethargic, drowsy, confused, coma)
- (Seizures)
- (Focal neurological signs)



## Study of HSV-1 encephalitis\*

- 91% febrile on admission
- 76% disorientated
- 59% speech disturbances
- 41% behavioural change
- 33% seizures

\*Raschilas et al 2002 Clin Infect Disease





# VIRAL ENCEPHALITIS – ED PRESENTATIONS

More subtle presentations now recognised

- Low grade fever
- Speech disturbances (dysphasia, aphasia)
- Behavioural changes

Subacute and chronic presentations can be caused by CMV, VZV, HSV (immuno-compromised)

**Any adult with seizure + fever or seizure from which they do not recover must be investigated for possible CNS infection**



# VIRAL ENCEPHALITIS – FOCUSSED HISTORY

Recent rashes

Vaccination history

Travel history

Recent animal/insect bites, contact with sick animals

Immunosuppression (HIV, transplant)

Drugs, alcohol



# VIRAL ENCEPHALITIS – ED INVESTIGATIONS

## General

- Haematological and biochemical blood screen
- Serology, blood cultures, HIV
- Drug screen, urine analysis
- CXR

## Neurological

- CT head, MRI brain
- LP (if not contraindicated on cranial imaging)
- EEG





## ED INVESTIGATION: CSF STUDY

Opening pressure

Send samples for

- Cell count and differential
- Protein, glucose (plasma glucose)
- Gram stain and culture
- Viral PCRs (HSV 1\*, HSV2, VZV, EBV, CMV, enteroviruses)
- Other tests as appropriate (discuss with micro!)

**\*HSV-1 CSF PCR still positive in 80% pts after one week of treatment  
(may be negative in first few days)**  
**PCR tests for HSV have overall sensitivity and specificity >95%**



## ED INVESTIGATION: CSF STUDY

	Viral	Bacterial	TB	Fungal	Normal
Opening pressure	Normal/high	High	High	High/v. high	10-20 cm
Colour	Clear	Cloudy	Cloudy/yellow	Clear/cloudy	Clear
Cells/mm <sup>3</sup>	Sl. increase 5-1000	High/v. high 100-50,000	Sl. increase 25-500	Normal/high 0-1000	< 5
Differential	Lymphocytes	Neutrophils	Lymphocytes	Lymphocytes	Lymphocytes
CSF/plasma glc ratio	Normal	Low	Low/v. low (<30%)	Normal/low	66%
Protein (g/l)	Normal/high 0.5-1	High >1	High/v. high 1-5	Normal/high 0.2-5	<0.45

Bloody tap: subtract 1 WBC for every 700 RBCs  
 subtract 0.1g/l protein for every 1000 RBCs

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# VIRAL ENCEPHALITIS: CASE STUDY

# 4



## CASE : MARCH 2015

32 yrs  
female  
patient

Complaint  
s of severe  
progressiv  
e  
headache  
since  
13/03/15

Mild to  
moderate  
grade  
fever for 2  
days (since  
15/3/15),

Quadripar  
esis more  
on right  
side since  
15/3/15,

Altered  
sensorium  
since  
15/3/15,

One  
episode of  
vomiting  
on  
15/3/15,

One  
episode of  
? seizure  
like  
activity





**CASE : MARCH 2015**

**PRIMARY SURVEY:**  
Febrile—Temp 103,  
Blood pressure  
90/60mmHg, PR-110/  
Min.

**SECONDARY SURVEY:**  
chest - clear,  
abdomen - soft, non  
tender BS+,  
Neurologically-  
altered sensorium,  
aphasia, pupil small  
reacting, neck rigidity  
+, Kernig's +VE,  
planter B/L mute



**CASE : MARCH 2015**

**Meningoencephalitis**

- ? Viral
  - ? Herpes
  - ? Japanese Encephalitis
- ? Tubercular



**CASE : MARCH 2015**

CSF

TLC-150/cumm, P-5%,L-95%, RBC-1000/cumm,

Glucose-123 mg%,

Protein-308.4 mg%.

CRYPTOCOCUS ANTIGEN- Negative,

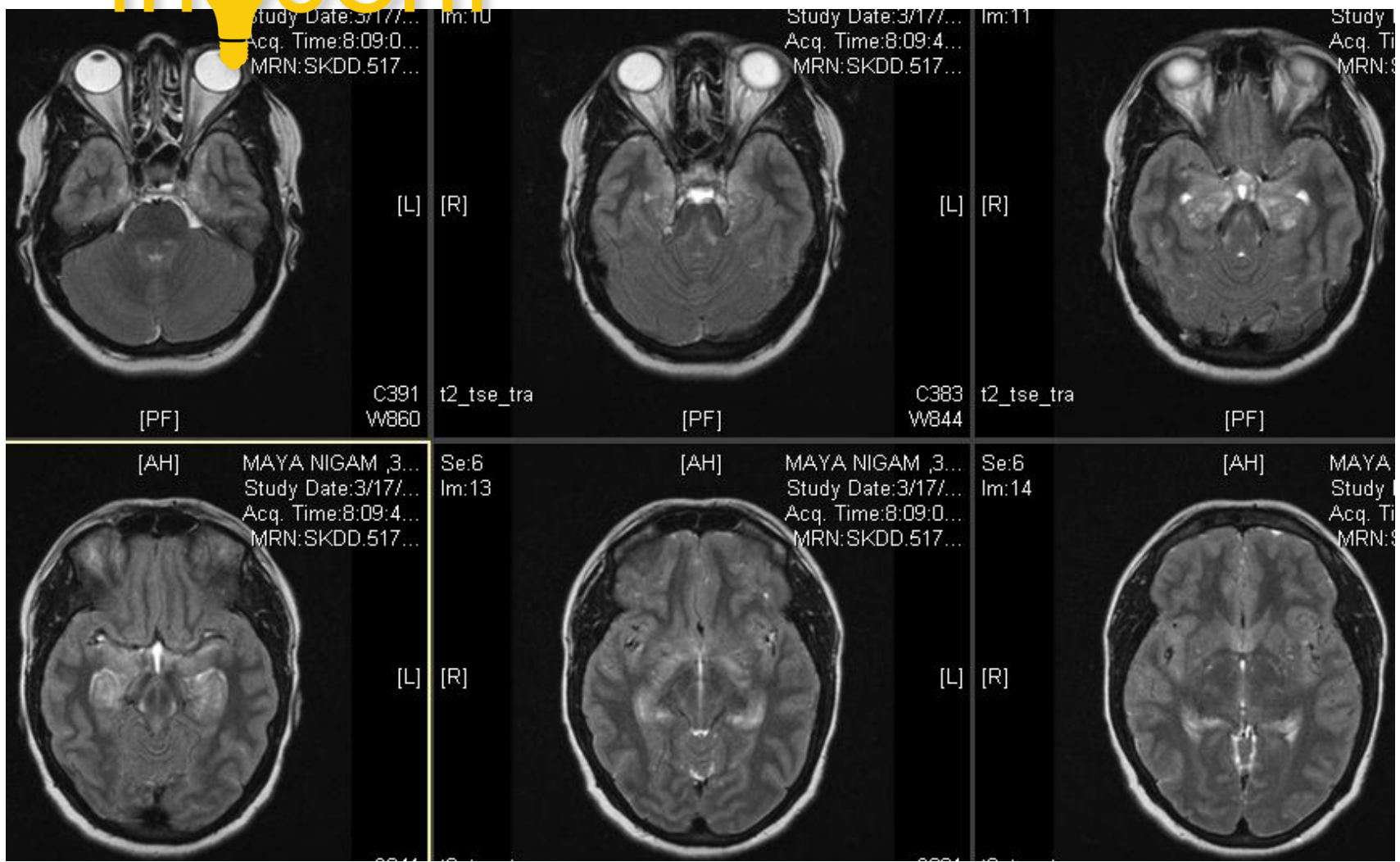
CSF FUNGUS CULTURE showed no growth; CSF - GRAM'S STAIN showed negative;

CSF - AFB STAIN showed No AFB

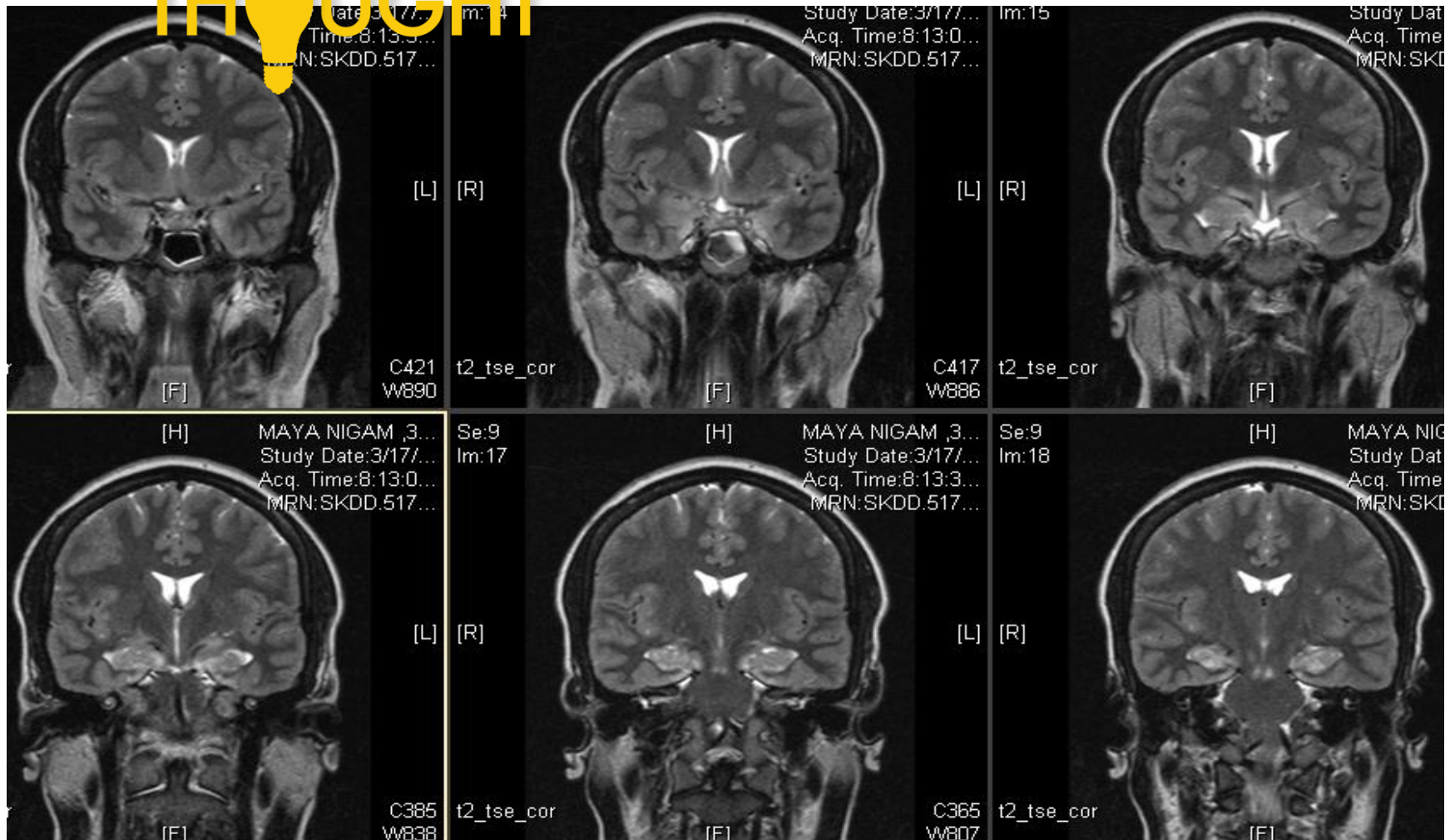
INDIA INK (CSF) negative

PCR for TB negative

PCR for JE Negative







# VIRAL ENCEPHALITIS: ED MANAGEMENT

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# VIRAL ENCEPHALITIS – ED MANAGEMENT

ABC: O<sub>2</sub>, Tube, Fluids, NG feed?

## Acyclovir

- Start as soon as suspect viral encephalitis
- IV aciclovir 10mg/kg tds
- 14-21 day course in confirmed HSE
- Monitor renal function
- Only stop if definite other diagnosis made

Antibiotics too if delay in getting CSF/imaging

Management of complications (brain swelling, seizures)

# VIRAL ENCEPHALITIS – ED MANAGEMENT

**Independent predictors of a poor outcome for patients with HSV encephalitis**



Glasgow Coma Scale score of 6 or less

Focal lesions found on CT scan of the head

Increased patient age

Delays in initiating antiviral therapy longer than 4 days after onset

Marton R, Gotlieb-Steimatsky T, Klein C, et al. Acute herpes simplex encephalitis: clinical assessment and prognostic data. Acta Neurol Scand 1996;93(2–3):149–55.



# VIRAL ENCEPHALITIS: PEARLS & PITFALLS

6



**RECOMMENDED**

# PEARLS & PITFALLS

A common pitfall in the emergency department is not to consider CNS infection in the differential diagnosis of many nonspecific and apparently nonurgent clinical conditions. The evolution of CNS infection can be very rapid.

For many patients with CNS infections, the examination results are deceptively benign. Physical examination can help localize mass lesions and reveal papilledema, nuchal rigidity, or coinfections.

CT scanning and MRI can be very sensitive but nonspecific for CNS infections.

CSF studies in certain conditions can be difficult to interpret. In the severely immunocompromised patient, CSF can appear acellular or inappropriately consistent with aseptic meningitis. A nonspecific lymphocytic pleocytosis can be observed with a variety of conditions, including partially treated bacterial meningitis.



**RECOMMENDED**

# PEARLS & PITFALLS

Neuroimaging precedes LP in patients with altered mental status, a focal neurological examination, or frequent seizures. Bleeding diatheses and coagulopathies are corrected prior to the diagnostic LP.

The absence of red blood cells in the CNS does not exclude the diagnosis of HSV-1 encephalitis.

A “negative” LP does not exclude a viral CNS infection.

LP should be repeated when a patient is sent home from the ED and returns more than 24–48 hours later with a progression of symptoms.

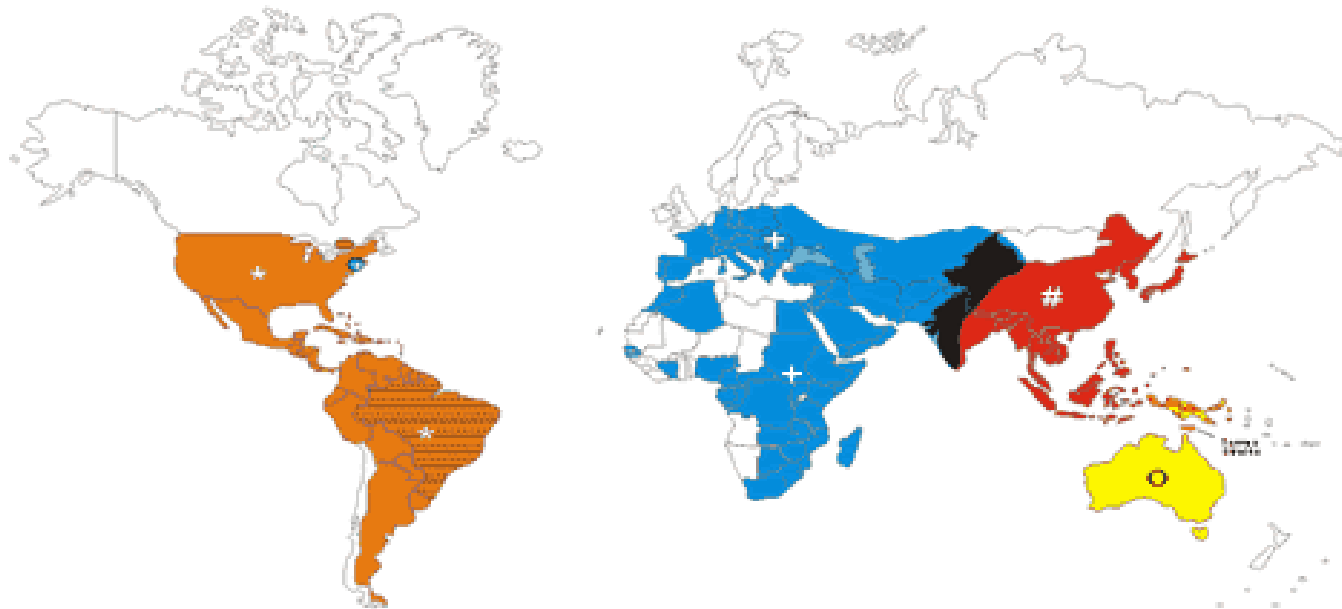
Tuberculous meningitis is considered in the differential diagnosis of HSV encephalitis.



**RECOMMENDED**

# PEARLS & PITFALLS

The Japanese Encephalitis Serocomplex  
of the Family Flaviviridae




- ★ St. Louis
- Rocio and St. Louis (Brazil)
- + West Nile
- # Japanese
- Japanese and Murray Valley
- Murray Valley and Kunjin

**CDC**  
Centers for Disease Control and Prevention





A hand is shown holding a white rectangular card. On the card, there is a yellow sticky note with black text. The text on the sticky note is a poem about remembering and missing someone. The hand is positioned behind the card, with fingers visible at the top and bottom.

Remembering  
you is easy,  
I do it  
everyday;  
but missing  
you is a  
heartache  
that never goes  
away.

thank you!