

Lecture 3



Viral infections of CNS

- Additional Notes
- Important
- Explanation
- Examples

Objectives

- Acute viral infections of the CNS.
Know the structure, Epidemiology, Pathogenesis, clinical presentations, Lab diagnosis, Treatment & prevention of:
 - ✓ Aseptic meningitis & paralysis
 - enteroviruses
 - polioviruses
 - ✓ Encephalitis;
 - Herpes simplex virus 1
 - Rabies virus.
 - Arboviruses (West Nile virus)

A. Viral Meningitis (Aseptic meningitis)

Etiology		Reservoir & transmission	infections	Management
Picornaviridae ✓ Nonenveloped ✓ Icosahedral ✓ ss (+) RNA	Enteroviruses (68-71) 1 st common etiological cause	Effect human (children more than adults) Spread; 1. Fecal - oral route (mainly) 2. Inhalation	<ul style="list-style-type: none"> Mostly Asymptomatic Infections Neurologic Diseases <ul style="list-style-type: none"> ✓ Aseptic meningitis ✓ Paralysis ✓ Encephalitis 	Treatment; No antiviral Prevention; 1. Sanitation & Hygienic measures 2. Poliovirus vaccines
	Poliovirus(1, 2&3 types)	1. Blood 2. Peripheral nerves	<ul style="list-style-type: none"> destruction of motor neurons of AHCs Rarely affects brain stem(bulber poliomyelitis) <ol style="list-style-type: none"> No illness –Asymptomatic 90-95% Minor Illness -Abortive poliomyelitis (No CNS involvement) 4-8% Major Illness 1-2% <ul style="list-style-type: none"> ✓ Nonparalytic poliomyelitis (Aseptic meningitis) ✓ Paralytic poliomyelitis: (Flaccid paralysis) It doesn't cause Encephalitis 	

◆ Lab Diagnosis

1. Virus isolation (variable)



2. Serology (limited value)

■ CSF in aseptic meningitis;

- ✓ Lymphocytosis
- ✓ Glucose level is normal or slightly low
- ✓ Protein level N or slightly high
- ✓ EV RNA detected in CSF by RT-PCR*

A. CON. Viral Meningitis (Aseptic meningitis)

◆ Poliovirus vaccines

Vaccine		Abbreviation	Route of administration	Adverse effects
Inactivated polio vaccine (Salk)	Killed	IPV Injected polio vaccine	Injection	local reactions
Live-attenuated polio vaccine (Sabin)	Live	OPV Oral polio vaccine	Oral	Vaccine -Associated Paralytic Poliomyelitis in adults and immunocompromised

Intake

Combination vaccine

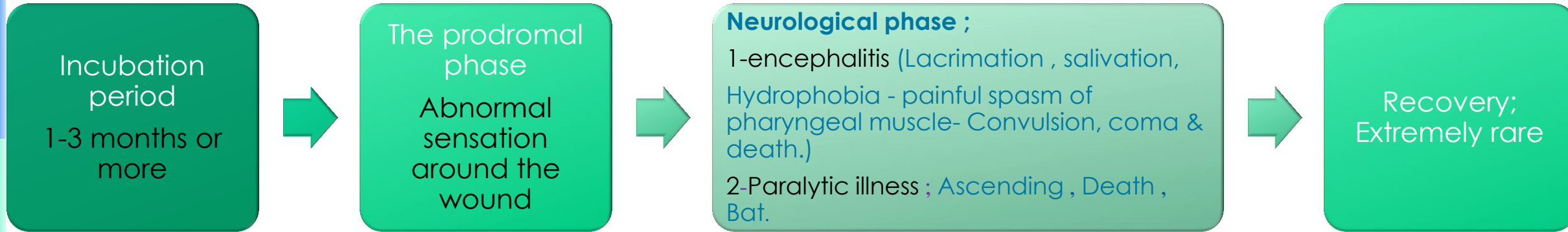
- ✓ children – 4 doses of PV
- ✓ Adulthood (IPV) for
 - Travelers to polio-endemic countries
 - HCW(Health care workers)

B. Viral Encephalitis

Etiology	Characteristics	diagnosis	Management
<p>Herpes simplex virus -1 (HSV-1)</p> <ul style="list-style-type: none"> ✓ dsDNA ✓ Enveloped ✓ Icosahedral Virus 	<ul style="list-style-type: none"> • Fever, headache, vomiting, Seizures & altered mental status. • High mortality rate 	<ul style="list-style-type: none"> ▪ MRI ▪ CSF <ul style="list-style-type: none"> ✓ Lymphocytosis ✓ Glucose level is normal ✓ Protein level high ✓ detection of HSV-1 DNA by PCR. 	<p>treatment : Acyclovir. (the only treatable viral disease of CNS)</p>
<p>Rabies virus ; Rhabdoviridae</p> <ul style="list-style-type: none"> ✓ s.s (-)RNA genome ✓ Helical nucleocapsid, ✓ Enveloped virus. 	<p>Reservoir: cats, dogs & other animals</p> <p>Transmission;</p> <ul style="list-style-type: none"> ✓ Bite of a rabid animal(Common route) ✓ Inhalation ✓ Corneal transplant 	<ul style="list-style-type: none"> ▪ PCR; R. RNA in saliva ▪ Rapid virus antigen detection (IF) <ul style="list-style-type: none"> ✓ Neck skin biopsy ✓ Corneal impressions ✓ Brain tissue ▪ Histopathology <ul style="list-style-type: none"> ✓ neuronal brain cells ✓ intracytoplasmic inclusions (Negri bodies) ▪ Virus cultivation 	<p>Prevention</p> <ul style="list-style-type: none"> ▪ Control measures ▪ Pre-exposure prophylaxis (Vaccine) Persons at increased risk of rabies (vets, animal handlers) ▪ Post-exposure prophylaxis <ul style="list-style-type: none"> ✓ Wound treatment ✓ Passive immunization(human anti-rabies immunoglobulin around the wound & I M.) ✓ Active immunization. Human Diploid Cell Vaccine (HDCV) 5 - 6 doses

B. CON. Viral Encephalitis

◆ Rabies (A fatal acute encephalitis)-zoonotic disease .



Etiology	Characteristics	diagnosis	Management
Arboviruses West Nile virus → • Illness meningitis • Encephalitis	<ul style="list-style-type: none"> ✓ Reservoir: Wild birds & Mammals ✓ Vector: Mosquito, ticks & Sandfly ✓ Transmission: bite of infected vector 	<ul style="list-style-type: none"> A. Isolation (Gold standard) <i>Samples:</i> blood, CSF, Viscera <i>Cell culture</i> → CPE → Identify B. IgM -AB - ELISA, IF C. Arbovirus RNA by RT-PCR 	<p style="text-align: center;">Prevention</p> <ul style="list-style-type: none"> ▪ Vector Control: <ul style="list-style-type: none"> ✓ Elimination of vector breeding sites ✓ using insecticides ✓ Avoidance contact with vectors ▪ Vaccines: <ul style="list-style-type: none"> ✓ Tick-borne encephalitis vaccine ✓ Japanese encephalitis vaccine

Quiz

1..... infection of meningitis can cause brain damage and lead to death:

- a) Viral b) Bacterial c) Fungal

2.A patient with CSF analysis (glucose 20, protein 150) is diagnosed with:

- a) Septic meningitis b) Aseptic meningitis

3.A viral isolation sample is taken from:

- a) Stool b) Blood c) Saliva

4.Arbovirus comes from:

- a) Bats b) Mosquitos c) Flies