



Approach to Central Nervous System

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Departement of pediatric infectious disease

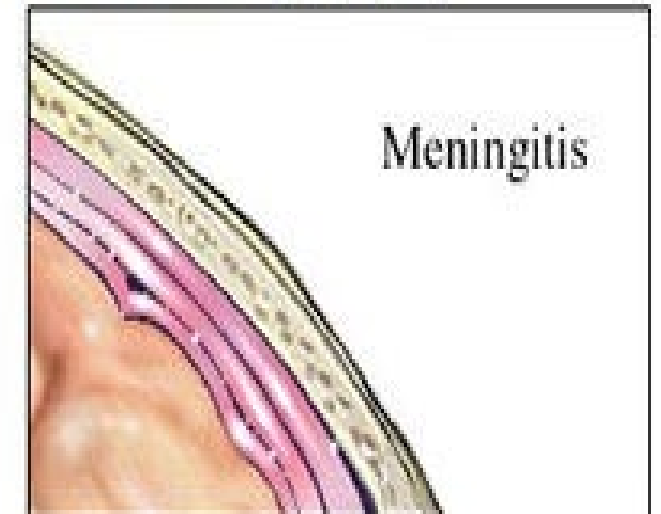
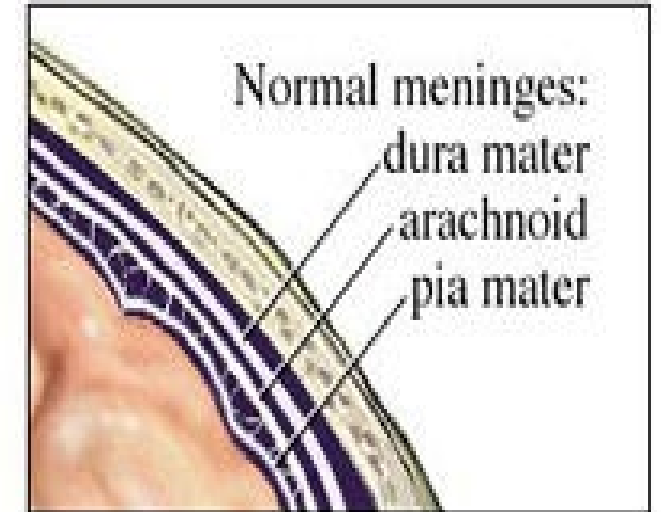
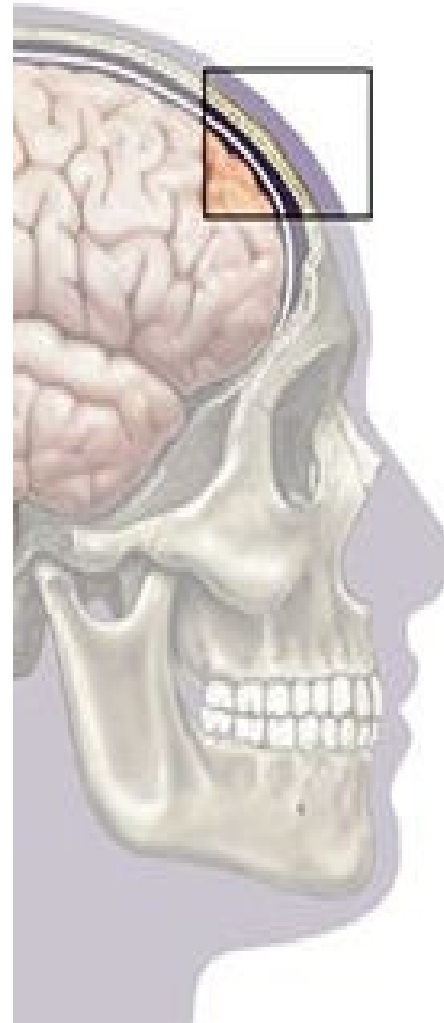
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Central Nervous System

- ▶ Meningitis
- ▶ Encephalitis
- ▶ Brain abscess, Empyema

Definition

- ▶ **Meningitis:** Inflammation of pia mater, arachnoid and cerebrospinal fluid
- ▶ **Encephalitis:** Inflammation of brain parenchyma
- ▶ **Brain abscess/Emphyema**
: pus collection within/around brain parenchyma



When we suspect meningitis?

- ▶ Fever + specific symptoms/signs of meningeal/brain involvement
 - ▶ Meningeal sign especially after 18 mo
 - ▶ ↓level of consciousness
 - ▶ poor feeding
 - ▶ Psychosis, Irritability
 - ▶ Focal neurological signs
 - ▶ Seizure in some cases
 - ▶ Increased intracranial pressure signs
- ▶ Fever + any of the following:
 - ▶ Petechia, purpura
 - ▶ Age < 1 mo.
 - ▶ Age: 1-2 mo. +increased inflammatory markers
 - ▶ Intracranial device
 - ▶ Recent intracranial surgery/trauma(< 3 mo.)
 - ▶ CSF leak
 - ▶ Cochlear implant
- ▶ Unexplained coma > 6 hours

Signs & symptoms of Increased ICP

- Severe headache
- Intractable vomiting
- Bulging fontanel
- Papilledema
- Oculomotor or abducens nerve palsies
- Altered level of consciousness
- Seizures
- Cushing's response(HTN ,Bradycardia, apnea or hyperventilation)
- Signs of herniation (unequal pupils, irregular respiration, low level of consciousness, unresponsive pupils)

When we suspect in patients with fever+ seizure?

- ▶ Age < 6 mo.
- ▶ Age < 6 mo. - 1 yr. and incomplete Hib/Pneumococcal immunization
- ▶ Previous use of antibiotics(1 week)

When we suspect Encephalitis?

- ▶ ↓level of consciousness/ psychosis + 2/3 of the following
 - ▶ Fever
 - ▶ Focal neurological signs
 - ▶ Seizure
 - ▶ Pleocytosis (>5 cell/hPF)
 - ▶ Ab NL EEG
 - ▶ Ab NL CT or MRI

When we suspect Brain abscess/empyema

- ▶ Classic triad:
 - ▶ Headache
 - ▶ Fever
 - ▶ Focal neurological deficits
- ▶ Any patient with focal neurological signs
- Especially in patients with cyanotic heart disease/ immunodeficiency

How can we confirm the diagnosis of meningitis?

- CSF analysis
- CSF gram stain
- CSF culture

CSF finding in CNS infections

Condition	WBCs/hPF	% PMN	Protein (mg/dl)	Sugar / BS (mg/dl)
Normal	< 5	1-3	< 45	> 75% ,(> 50)
Normal neonate	< 30	2-3	< 120	(> 36)
Bacterial meningitis	> 100-10,000	> 75-95	> 100	< 50% (< 40)
Encephalitis, Viral meningitis, brain abscess	< 100-1000 (except in mumps)	< 50 (except in 1 st 8-24 hr. & mumps)	< 200	(NL, <40 in mumps)
Partially treated bacterial meningitis(> 2-3 d)	> 5	Usually > 50	> 100	Usually < 50% (< 40)

Contraindications of LP

1- Absolute

- **Cardiopulmonary** compromise
- Increased **ICP** signs
- **Infection** at the site of needle entry

2- Relative

- Thrombocytopenia (Plts **<50K**)
- Coagulopathy

How can we confirm the diagnosis of encephalitis?

- ▶ CSF analysis
- ▶ PCR of CSF for viruses(HSV, enteroviruses, Mumps, ...)
- ▶ Brain MRI/CT scan
- ▶ EEG

How can we confirm the diagnosis of brain abscess/Empyema?

- ▶ MRI with gad./ CT scan with contrast
- ▶ Stereotactic-guided aspiration or drainage of the brain lesion.

Empiric treatment of CNS infections

- ▶ Meningitis: Ceftriaxone+ Vancomycin + Ampicillin(< 2 mo.)
- ▶ Encephalitis: Acyclovir
- ▶ Brain abscess/empyema: Ceftriaxone+ Vancomycin + Metronidazole

