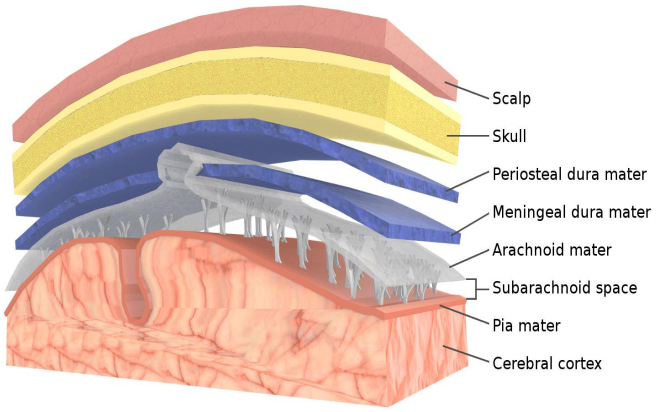
L1

CNS Infection

D. Hazim

CNS infection classified into:

- Meningitis
- Encephalitis
- Brain abscess
- Transverse myelitis



Meningitis

Acute infection of the meninges presents with a characteristic combination of

- Pyrexia.
- Headache.
- Meningism.

Meningism, which can occur in other situations (e.g. subarachnoid hemorrhage), consists of:

- ✓ Stiffness of the neck, often with other signs of meningeal irritation:
- ✓ Kernig's sign (with the hip joint flexed, extension at the knee causes spasm in the hamstring muscles).
- ✓ Brudzinski's sign (passive flexion of the neck causes flexion of the thighs and knees).

***Meningitis could be*:**

- Viral
- Bacterial (TB, pyogenic).
- fungal
- Carcinomatous

Acute **1-3 days**

Subacute **3d – 3 wk.**

Chronic **more than 3 wk.**

Bacterial meningitis

The most 3 common organisms causing meningitis in young age group are:

- ➢ Strept. Pneumococci (mostly after age of 20)
- ➢ Neisseria. Meningococcal
- ➢ H. Influenza

Strept. pneumia are the most common nowadays, but in a certain group of patients there is a predilection to develop pneumococcal type of meningitis especially in alcoholic ,immunocompromised ,splenectomaized patients and those with complement deficiency.

Listeria monocytogens is a very important cause of meningitis in patients who are:

- Imunocompromised
- Elderly
- Pregnancy
- Alcoholic

Neonate	**Gram-negative bacilli (*Escherichia coli*, *Proteus* etc.)** **Group B streptococci**
Pre-school child	*Haemophilus influenzae*
Older child and adult	*Neisseria meningitidis* *Streptococcus pneumoniae*

Pathogenesis

Bacterial infection reaches the CNS either by

- direct invasion
- haematogenous spread
- embolisation of infected thrombi.
- There can also be direct extension from contiguous structures via erosion of an osteomyelitic focus.
- Iatrogenic (e.g. following ventriculo-peritoneal shunt, intracranial pressure monitor or surgery).

Risk factors

Penetrating cranial trauma	
Foreign bodies within the CNS	CSF shunts predispose to staphylococcal meningitis
Defect in the immune system	Impairment of complement activation predisposing to the development of meningococcal meningitis
	Splenectomy or splenic dysfunction, as in sickle cell disease, associated with pneumococcal meningitis
	T lymphocyte dysfunction (HIV disease, chemotherapy or malignancy) predisposes to *Listeria monocytogenes* meningitis
Defect in the mucocutaneous barrier	Skull base fracture predisposes to pneumococcal meningitis

Clinical features

Headache, drowsiness, fever and neck stiffness are the usual presenting features.

In severe bacterial meningitis, the patient may be comatose and later there may be focal neurological signs.

Meningococcal meningitis is associated with a purpuric rash in 70% of cases.

Diagnosis

- ✓ Mortality rate is high in meningitis reaches 30 % in developed countries, so any delay in treatment will increase the percentage of mortality
- ✓ For diagnosis of meningitis, we need a high index of suspicion
- ✓ CT scan is not mandatory but it is preferable in meningitis we must examine fundi to ensure there is no raised ICP, and then we do lumbar puncture to assess the CSF.

CSF INDICES IN MENINGITIS

Condition	Cell type	Cell count	glucose	protein	Gm stain
normal	lymph	0-4	60%or more of B.S	N	-
viral	lymph	10-2000	N	N	-
bacterial	polymor	1000-5000	Low	Nor increase	+
TB	L/P,M	50-5000	Low	increase	often

Chemotherapy of bacterial meningitis

- ➢ N-meningitides — Benzyl penicillin
- ➢ Strep. pneumoniae — Cefotaxime
- — Sensitive to B-lactams — Ceftriaxone
- — Resistant — add Vancomycin
- ➢ H. Influenza — Cefotaxime

Ceftriaxone

- ➢ Listeria monocytogens — Ampicillin + gentamicin

Treatment of pyogenic meningitis of unknown cause.

1. Patients <u>with a typical meningococcal rash</u>
   - benzyl penicillin 2.4gIV.6-hourly
2. Adult aged 18-50 years <u>without meningococcal rash</u>
   - Cefotaxime 2 g IV.6-hourly
   - Ceftriaxone 2g IV.12-hourly
3. Patient in whom penicillin-resistant pneumococcal infection is suspected
   - Cefotaxime or ceftriaxone and add- Vancomycin I g Iv12-hourly
4. Adult aged over 50years and those in whom Listeria monocytogens suspected
   - As for 2 but add Ampicillin 2g IV4-hourly or Co-trimoxazole
5. Patients with a clear history of anaphylaxis to B-lactams
   - Chloramphenicol 25 mg/kg IV.6-hourly plus 1

Steroid

— Steroid must be given for all patients and preferable to be given before antibiotics, four hours before antibiotics then for 4 days only DEXAMETHASONE is preferable. Strept. Is the most organism that benefit from steroid because it is the most to cause adhesion an hydrocephalus.

Complication of meningococcal meningitis

- Rash
- Shock
- Renal failure
- Intravascular coagulation
- Pericarditis

Major intracranial complication of bacterial meningitis

- Transtentorial herniation
- Hydrocephalus
- Infarction
- Seizures

Chronic and recurrent meningitis

Characteristic neurological syndrome for>4weeks & persistent inflammation in CSF.

Causes:

- ➢ Meningeal infection (TB ,FUNGAL)
- ➢ Malignancy
- ➢ Chemical meningitis

Tuberculos meningitis

- ✓ Account of 1 % of clinical TB
- ✓ Increase with HIV
- ✓ Long history of fever, vomiting, anorexia, focal neurological signs, urinary retention, reduce conscious.

Symptoms

- Depression'
- Confusion
- Behavioral changes
- Vomiting
- Low-grade fever
- Lassitude

Signs

- ✓ Meningism (may be absent)
- ✓ Ocular palsies
- ✓ Cranial nerve palsies are common and often initially involve eye movements resulting from III, IV or VI nerve palsy.
- ✓ There may be facial weakness (VII), optic neuropathy (II), progressive hearing loss (VIII).
- ✓ Papilledema
- ✓ Depression of conscious level
- ✓ Focal hemispheric signs

Diagnosis

CSF

1) The diagnosis is made by demonstration of AFB by ZN stain of CSF can use PCR.
2) CSF culture is the golden diagnostic tech take up to 6 weeks
3) Slightly yellow, lymphocytic, with low glucose, and high protein

Radiology

- patients may show evidence of previous TB on chest X-ray
- CT brain scanning is commonly abnormal

There may be hydrocephalus, parenchymal enhancement,

Evidence of cerebral infarction or cerebral edema or focal tuberculoma.

- MRI is sensitive in showing meningeal enhancement, focal parenchymal abnormalities or the development of communicating or obstructive hydrocephalus.

Treatment:

INH 300mg → 9-12 months

Rifampicin 600 mg → 9-12.

Pyrazinamide 1.5_2 g → 2months

Ethambutol 15mg/Kg or streptomycin 15mg/Kg → 2months

Dexamethasone → 6wk