MENINGITIS

What is meningitis?

Meningitis:

Inflammation of the meninges identified by finding an abnormal number of white cells in the CSF

Bacterial meningitis:

Abnormal CSF with evidence of a bacterial pathogen

Encephalitis:

Inflammation of the brain

Aseptic meningitis:

Abnormal CSF with no demonstrated evidence of a bacterial pathogen. Possible causes include:

- viral meningitis
- tuberculous meningitis
- partially treated bacterial meningitits
- neighbourhood syndrome (adjacent abscess/inflammation)

Why is meningitis important?

Mortality:

- Untreated: 100%
- Neonates: 15-20%
- Older children: <10%

Morbidity:

50%-70% of survivors have some sequelae of the disease

- Deafness & blindness
- Cerebral palsy
- Variable patterns of non-specific developmental delay/neurological impairment

What is the severity?

At onset, it is impossible to tell... because, at onset, it is impossible to know the aetiological agent.

REGARD ANY PATIENT WITH SUSPECTED MENINGITIS AS SEVERELY ILL

- ALL patients with suspected meningitis MUST HAVE A LUMBAR PUNCTURE (delay if there are signs of raised intracranial pressure – ask if unsure-, but don't delay treatment, AND arrange an urgent CT scan)
- Never do nothing
- Always refer to hospital/admit
- Always treat, until treatable causes are excluded

What is the cause?

Common bacteria

1) **Neonates:**
   - Group B Streptococcus
   - Escherichia coli
   - Listeria monocytogenes (rare but important)
2) **Infants and Toddlers:**
   - Streptococcus pneumoniae
   - Neisseria meningitidis
   - Haemophilis influenza (becoming very rare)
3) **School going Children and Adolescents:**
   - overall decreased incidence compared with the younger child
   - S pneumoniae, N meningitidis, H influenza

Other Organisms

- Tuberculosis
- Herpes (treatable)
- Other Viruses
- Fungi (esp Cryptococcus neoformans)

"Nearby" inflammation (neighbourhood syndrome)

- brain abscess
- mastoiditis
- sinusitis

What is the clinical usual presentation?

Presentation

- Neonates: symptoms and signs of sepsis neonatorum
- Toddlers: irritability, inconsolability, convulsions, +/- neck stiffness, altered level of consciousness
- School going: headache, neck stiffness, vomiting, photophobia

Complications

- Raised intracranial pressure: depressed LOC, vomiting, high BP, bradycardia, focal signs
- SIADH: urine osmolality inappropriately high for serum osmolality, hyponatraemia
- Intracranial pus: subdural, brain

What investigations are required?

- Lumbar puncture (check platelet count >20): MC&S, chemistry, AFB&culture, India ink (+/- cryptococcal antigen)

> LP may be delayed if severely ill (especially neonates), focal signs, or an altered level of consciousness. THE NEED TO DELAY LP DOES NOT MEAN THAT ANTIBIOTICS SHOULD BE DELAYED

- Chest X-ray
- Blood culture

What is the management?: Antibiotics

Neonates and infants (< 3 months)

- AMPICILLIN 50mg/kg 6H IV and CEFOTAXIME 50mg/kg 6H IV (12 hourly if very immature or if very young)

Toddler and older child (>3 months)

- AMPICILLIN 50mg/kg 6H IV and CEFOTAXIME 50mg/kg 6H IV

Tuberculosis

- Rifampicin, INH, PZA, Ethionamide (see guideline "Tuberculous Meningitis")

Encephalitis

- For herpes, ACYCLOVIR 10mg/kg 8H IV for 7 days (for extra precision, use Shann 'Drug Doses')

What is the management?: Other measures

Decreasing inflammation

- DEXAMETHASONE 0,15mg/kg 6H IV half an hour before antibiotics for 1-2 weeks

Minimising raised intracranial pressure

- general measures: raise head of bed 30º, FUROSEMIDE 1mg/kg stat (once only), fluids at normal maintenance, maintain $PaCO_2$ 3,5-4kP
- MANNITOL 0,25-0,5 g/kg IV 2H prn for 1-2 days (you must be sure of, and document, a response; and check $_s$osmolality <320mmol/l)

Complications

- hydrocephalus: repeated LP's, VP shunt (refer neurosurgeon)
- subdural fluid or pus: refer to neurosurgeon

What is the follow up?

- Nil: viral meningitis
- Level 1 & 2: neurodevelopmental monitoring
- Level 3: hearing and vision

What are the preventive measures?

Vaccines

- BCG: efficacy uncertain
- HiB Titre: efficacy certain

Contact prophylaxis

- Neisseria: RIFAMPICIN for two days
- Haemophilis: RIFAMPICIN for two days
- Remember to notify these two

What is the challenge to us?

- Early Diagnosis
- Aggressive Management (including establishing efficient referral systems)
- Identification of Morbidity (including establishing support systems for disabled children)