



MENINGITIS

KEY POINTS

Patients with bacterial meningitis need urgent attention and immediate antibiotics. Check list for meningococcal meningitis

Do not forget antibiotic prophylaxis and notification

Viral meningitis is more common than bacterial but tuberculous meningitis is very rare

The risk to health care workers of acquiring meningitis is very low but Source Isolation precautions should be taken initially

Surgical procedures on the brain, particularly extraventricular and lumbar drains are likely to lead to ventriculitis and meningitis

BACTERIAL MENINGITIS

The prognosis for bacterial meningitis is grave if diagnosis and treatment are delayed. The disease may be very rapidly progressive. Despite antibiotics, the overall mortality is still about 7%. Bacterial meningitis is more common in children than in adults.

The organisms are harboured in, and excreted from the respiratory tract. Close contacts are often carriers of the same organism. Outbreaks of disease may occur in groups of young people in close communities (e.g. in camps, in boarding schools or in army recruitment camps).

COMMON CAUSATIVE ORGANISMS

***Neisseria meningitidis* (meningococcus)**

The most common cause. Peaks in young children and young adults. Despite grave anxieties, cross infection in hospital and infections in staff contacts rarely occur.

Haemophilus influenzae

Almost always occurs in young children (3 months to 6 years of age). Often capsulate (type b). Very uncommon in the UK with the introduction of vaccine.

***Streptococcus pneumoniae* (pneumococcus)**

Common in the very young and elderly patients. Often virulent strains. Infection commonly follows viral infection.

Other bacteria

Many other bacteria can cause meningitis. For example, in neonates, Group B streptococci, *Escherichia coli* and *Listeria monocytogenes* are more common than the bacteria mentioned above. Any other bacterium may cause meningitis as part of a septicaemic illness.

Mycobacterium tuberculosis

This is now very rare in the UK, but it will be suspected in certain populations and on the results

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		Review Date: April 2009	
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of the CSF examination.

MANAGEMENT

- Source isolate the patient
- Notify
- Inform Infection Control Team who will advise about when to stop isolation precautions. This depends on the persistence and infectivity of the proven or putative cause of meningitis
- Visitors need not wear protective clothing but should be instructed to wash their hands using any suitable hand disinfectant (eg chlorhexidine gluconate (Hibiscrub)) on leaving the isolation room

Check list for meningococcal disease

Send

- Blood cultures
- CSF for microscopy and culture. Warn the laboratory staff it is coming
- CSF for chemistry and a sample into a citrate glucose tube
- Blood glucose, routine haematology, clotting screen, renal function
- EDTA (sequestrene) blood to Microbiology for PCR
- Pernal or good throat swab (request "for meningococcus")
- If skin lesions, aspirate and smear on to a glass slide


Management

- Start antibiotic immediately
- Source isolate for 24h
- Consider prophylactic antibiotics for family contacts

Inform

- CCDC or
- Infection Control Team who will inform CCDC

Antibiotic prophylaxis may be advised for close family contacts of patients with meningococcal disease and siblings of those with *Haemophilus influenzae*. Throat or pernasal swabs should be taken beforehand to establish whether carriage is present but antibiotic prophylaxis must not be delayed until these results are available. Common antibiotics chosen are rifampicin or ciprofloxacin. The advantage of ciprofloxacin is that it may be given as a single dose. Antibiotic prophylaxis is not usually given to staff caring for patients with meningitis. The risk of acquiring the infection is negligible. An exception would be made for those exposed to a large dose of secretions (eg mouth-to-mouth resuscitation). Acquisition of the causative organism may result in carriage and rarely in disease.

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VIRAL MENINGITIS

Less sinister than bacterial meningitis but much more common. Diagnosis should first exclude (treatable) bacterial meningitis.

SPREAD

Although the viruses which cause these diseases tend to be highly infectious because the viruses are shed in respiratory secretions and/or faeces, they rarely cause detectable cross infection resulting in meningitis. This is because most contacts will have a mild respiratory infection and will not have meningitis. Viruses can be transmitted by the faecal-oral, the respiratory route or by direct or close contact.

COMMON ORGANISMS

- **Enteroviruses**, particularly echoviruses which are most common in late summer; A different serotype predominates each year.

Other viruses such as:

- **Coxsackie** viruses (also enteroviruses)
- **Mumps** virus (often with encephalitis)
- **Herpes simplex** (particularly type 2)
- **Varicella-zoster**

can cause meningitis, sometimes alone but usually as part of the classic syndrome caused by each of these.

MANAGEMENT

- Source Isolate the patient
- Notify disease
- Inform Infection Control Team
- Infection Control Team to inform CCDC and to ensure rapid diagnosis
- Visitors need not wear protective clothing, but should be instructed to wash their hands using chlorhexidine gluconate (Hibiscrub) on leaving the room

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POST-OPERATIVE BACTERIAL VENTRICULITIS

Ventriculitis or meningitis following neurosurgery occurs in between 0.5 and 5% of cases. The common organisms are *Staphylococcus epidermidis*, *Staphylococcus aureus* and sometimes Gram-negatives. Optimal treatment is achieved using intraventricular vancomycin and/or gentamicin given through an external intraventricular drain (EVD).

MANAGEMENT OF VENTRICULITIS

- Do not sample ventricular CSF unless there is a clinical indication or the patient needs intraventricular antibiotics
- Take samples and give antibiotics via the 3-way tap using aseptic technique
- Antibiotics: Gentamicin and amikacin can be given into the ventricular and other (eg lumbar) subarachnoid space. Vancomycin and amphotericin B can only be given into the ventricles (risk of arachnoiditis if given into the spinal CSF)
- The usual dose of gentamicin is 5mg and of vancomycin 10mg given once daily
- The usual hold time after putting in antibiotics is 1h
- Maintain antibiotics in the ventricles by raising bag above the level of the head
- Sample daily to monitor CSF cell counts and bacteriology
- If ventriculitis fails to resolve, replace EVD and give the antibiotics twice a day and hold for 2 hours
- Replace the EVD weekly
- Continue antibiotics until cell count is consistently low (<20 cells/cu mm) and CSF culture negative
- Stop the antibiotics and if the CSF cell count remains low for 3 days, plan insertion of a permanent shunt

Note that CSF samples are enriched for 5 days in the laboratory to detect small numbers of damaged organisms.

Systemic vancomycin and vancomycin do not penetrate the blood-brain barrier, so should not be given in addition to the intraventricular antibiotics unless there is evidence of infection outside the subarachnoid space.

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		Review Date: April 2009	
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PERMANENT SHUNT INSERTION AFTER VENTRICULITIS

- Wait until cell counts consistently low, no organisms seen and enrichment cultures negative off antibiotics
- Leave for at least 3 days with daily sampling
- Procedure first on the list
- Operation to be performed by the most experienced surgeon available
- Dose of appropriate antibiotic to be given intraventricularly at the time of the procedure
- No visitors in theatre
- Use long tunnel if possible

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