



MENINGITIS

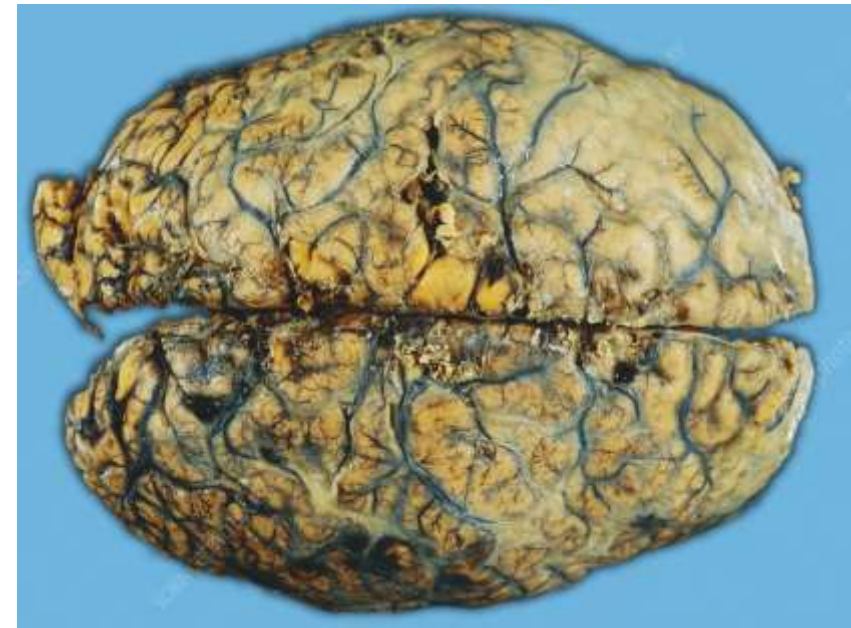


CONENETS

- Introduction
- Definition
- Etiology
- Modes of spread
- Characteristic nature of organism
- Identification test for organism
- Pathogenesis
- Symptoms
- Prophylactic treatment
- Treatment, Diagnostic tests, Chemotherapy

Introduction

- Meningitis is always cerebrospinal infection. It is a rare infection that affects delicate membranes that covers brain and spinal cord.
- Several types of disease, including bacterial, fungi, viral
- Bacterial meningitis can be life- threatening and spreads between people in close contact with each other



Definition

It is defined as an acute inflammation of the pia mater and the arachnoid membrane surrounding the brain and spinal cord

ETIOLOGY

- Bacterial
- Viral
- Parasitic
- Physical injury
- Cancer
- Certain drug (NASIDS)
- Head injury
- Cerebral abscess
- Middle ear infection

Route of entry

- Medical procedure
- Along peripheral nerves
- Blood or lymphatic system
- Skull or back bone fractures

Mode of spread

- Direct contact
- Indirect contact
- Respiratory droplets from nose and throat of infected people
- Kissing/close contact
- Contact with bodily wastes
- Sharing food, drinks, towels

Characteristic features

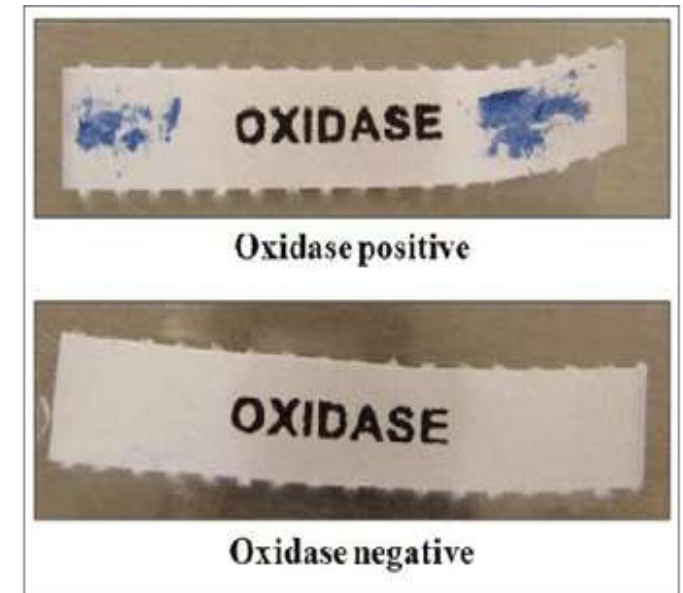
- NAME : *Neisseria meningitidis*
- SYNONYM: Meningococci, meningococcaemia, meningococcal infection, meningococcal meningitis
- FAMILY: *Neisseriaceae*
- CHARACTERISTICS:
 - Gram – negative , Non- spore forming, Non- motile, encapsulated organism.
 - Non acid-fast diplococci, which appears in kidney bean shape under the microscope.

characteristics

- Medium sized, smooth, transparent, non-pigmented, non-hemolytic, and convex colonies are produced on blood agar after overnight incubation at 35-37degree C
- It requires an aerobic environment with 5% CO₂ and enriched media containing blood for growth
- It has at least 12 serogroups, with serogroups A, B, C, W-135, Y are being the most commonly encountered serogroups from invasive disease cases
- It is oxidase and catalase positive

Identification test

- KOVAC'S OXIDASE TEST: this test determines the presence of cytochrome oxidase.
- Here kovac's oxidase reagent is used
- End point is purple color, if organism contains cytochrome c as part of their respiratory chain
- This test aids in the recognition of *N. Meningitidis*, but other member of the genus *Neisseria*, as well as unrelated bacterial species, may also give a positive reaction.



- Positive and negative quality control (qc) strains should be tested along with the unknown isolates to ensure that the oxidase reagent is working properly.
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CARBOHYDRATE UTILIZATION TEST (cystine trypticase agar method)(CTA): This test are used to validate the identification of a strain as *N. meningitidis*.

- Phenol red is used as indicator, that develops a yellow color in the presence of acid at PH of 6.8 or less.

IDENTIFICATION OF *N. MENINGITIDIS* SEROGROUP:

- Twelve serogroups, based on the biochemical composition of capsular polysaccharides are currently recognized: A, B, C, H, I, K, L, W135, X, Y, Z, and 29E



- Serogroup d is no longer recognized as a serogroup
serogroups A, B, C, W135 and Y are the 5 most common causes of bacterial meningitis
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- COMMERCIAL IDENTIFICATION KITS: several commercial identification systems that use biochemical or enzymatic substrates are available for identification of *Neisseria* spp.
- SEROTYPING AND SEROSUBTYPING OF *N. MENINGITIDIS* WITH MONOCLONAL ANTIBODIES (Mabs)

Pathogenesis

Bacteria enters blood stream/ trauma



Enters the mucosal surface/ cavity



Breakdown of normal barriers



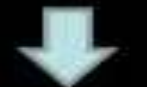
Crosses the blood brain barrier



Proliferates in the CSF



Inflammation of the meninges



Increase in ICP



Symptoms



- Fever and vomiting
 - Severe headache
 - Stiff neck
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- Dislike of bright lights
 - Very sleepy/difficult to wake
 - Confused
 - Seizures
 - Cold hands or feet
 - Mottled skin
 - Positive Kernig's sign
 - Positive Brudzinski's sign
 - Coma
 - Rashes
 - Photophobia

Prophylactic treatment

- Prophylaxis should be given to household members and kissing and saliva-exchanging contacts of a case of meningococcal meningitis. The decision to give prophylaxis to extended family contacts, close neighbour contacts or children attending day-care center where a case has occurred is controversial. It does not alter the course of an epidemic and close contacts are liable to become reinfected soon after prophylaxis.
- Prophylaxis of *H. influenzae* should be given to households in which there is at least one child under 48 months of age.

Epidemic focus

- The patient is hospitalized and hospitalized and isolated to condition that results of two pharyngeal mucus are negative
- Contacts and carriers should be treated with rifampicin for 3days as a prophylactic measures, the standard dose being given 3 times a day
- Polysaccharide meningococcal vaccines have been recently developed in some countries.

treatment

- most patients are given I.V antibiotic until the laboratory finding determine the type of meningitis. However, cultures should be taken before initiating antibiotics.
- To manage inflammation, dexamethasone (Decadron) or another corticosteroids is given I. V.
- This steroids should be used before or with the first dose of antibiotics (I.V 0.6 mg/kg/day in four divided doses for first 4 days of antibiotics) and should be confined to patients older than age 6weeks.
- Anti-fungal agent, such as amphotericin B (fungizone) and the triazoles, fluconazole (Diflucan) and itraconazole (sporanox).

Diagnostic test

blood cultures

This is important when a meningococcal infection is suspected.

Fungal culture:

- Done on sabouraud's dextrose agar or brain heart infusion agar.
- Two sets of medium was inoculated and incubated at 25°C and 37°C, growth is identified by its morphology
- Bird seed agar is used for culture of cryptococcus species.

Viral culture:

- Done using tissue culture, egg inoculation or animal inoculation.



Imaging

Computerized tomography (CT) or magnetic resonance (MR) scan of the head may show swelling or inflammation. X-RAY or CT scan of the chest or sinuses may also show infection in other areas that may be associated with meningitis.

Spinal tap (LUMBAR PUNCTURE)

For a definitive diagnosis of meningitis, you'll need a spinal tap to collect cerebrospinal fluid (CSF). In people with meningitis, the CSF often shows a low sugar (glucose) level along with an increased white blood cell count and increased protein.

spinal tap

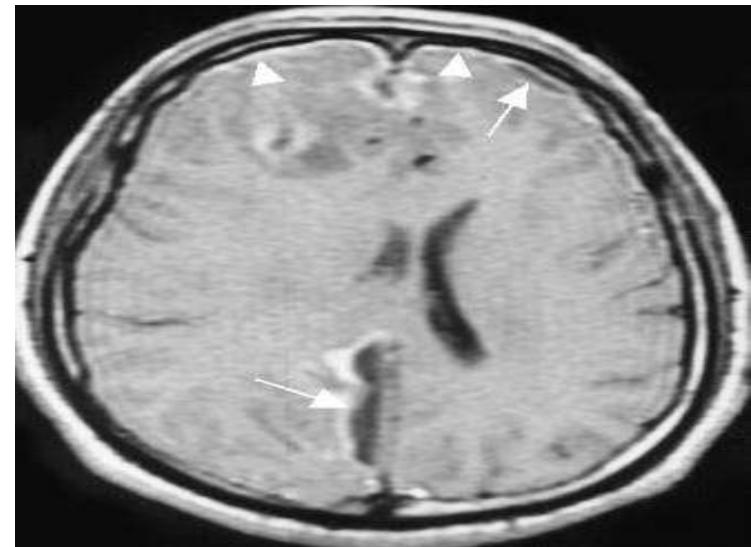
CSF analysis may also help your doctor identify which bacterium caused the meningitis. If your doctor suspects viral meningitis. He or she may order a DNA-based test known as a polymerase chain reaction (PCR) amplification or a test to check for antibodies against certain viruses to determine the specific causes and determine proper treatment.

Microscopical examination

- Microscopic examination of a gram-stained smear of CSF is done to detect the presences of microorganism. if negative latex agglutination test is done.
- ziehl-neelsen stained smear is performed for tubercle bacilli; if negative PCR detection can be done.
- India ink preparation of CSF is done to demonstrate capsulated budding yeast cell of cryptococcus neoformans

bacterial culture

- Chocolate and blood agar are used.
- The specimen is inoculated into an enriched liquid medium.
- Specimen may contain small bacteria which may not grow in solid culture medium.
- After 24hours incubation of liquid medium, subculture were made in solid culture media.
- If growth in culture, an antibiotic sensitivity test is performed.



Serology

- Latex agglutination test for antigen detection: This done for *s. pneumoniae*, *H. influenzae* and *In*, neonates ,test for antigens of group B streptococcus
- Serological test for antibodies to viruses: done depending on clinical diagnosis.
- Test to detect microbial antigen in urine: this test used to detect antigens present in urine.
- Detection of microbial endotoxin: **limulus lysate test** is extremely sensitive for detection of bacterial endotoxins.

Chemotherapy

External beam radiation may be used in conjunction with chemotherapy (eg: intrathecal thiotepa or methotrexate).

thank you