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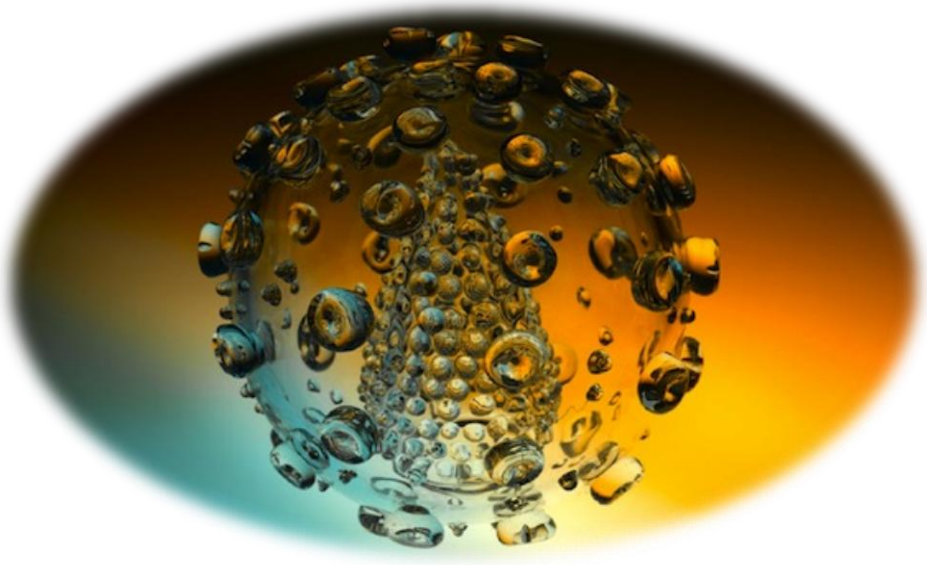
Microbiology Team

CNS BLOCK



Cerebral TB & other Chronic Cerebral Infections

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CAUSES OF CHRONIC MENINGITIS:

3 most important causes :

- Tuberculosis
- Brucellosis
- Partially treated meningitis

Others

- Viruses
- Fungi
- Parasitic

1- TUBERCULOSIS

Presentation:

Headache, weight loss, fever, night sweats, loss of appetite, usually elderly patients, common in HIV patients.

History:

Contact with TB patients

Cause:

[Mycobacterium Tuberculosis]

Investigations:

IMP: AFB stain and TB culture

- Cerebral T.B is a complication of pulmonary T.B.
- Tuberculosis and Brucellosis are important causes of fever of unknown origin.
- Brucella likes to affect spleen and liver.
- Tuberculosis and brucellosis can be differentiated on the basis of clinical history.

2-BRUCELLOSIS

Presentation:

Fever, night sweats, (usually no weight loss, no loss of appetite), patient is not very ill.

History:

Animal contact, or drinking of raw milk → sheep, or goat.

In children: maybe transmitted by dirt.

Cause:

[Brucella Melitensis]

Investigations:

Serology

3-PARTIALLY TREATED MENINGITIS

Presentation:

Present acutely initially
Not treated well
Patient will relapse

Example:

First, Patient presented with acute pyogenic meningitis and was treated with "oral, short duration" drugs Ex: Amoxicillin, because doctor thought he was treating a case of otitis media.
Patient comes back after several days because of complications and doctor now perform a lumber puncture.
Results show no growth of bacteria in culture (=Aseptic).

4-FUNGI

Cause:

[Cryptococcusneoformans] (AIDS defining disease)*
You have to do India ink to diagnose → look for capsulated organisms.
[Aspergillus] → Common in patients with Neutropenia (=low neutrophils).

5-PARASITES:

Cause:

[Toxoplasma Gonodii] (AIDS defining disease)*

*AIDs defining disease = when patient has the disease, you must investigate for AIDS.

History:

AIDs patient
Pregnant
Contact with cats

6-VIRUSES:

Cause:

Herpes, Mumps, HIV

Herpes simplex:

Type1 → Encephalitis

Type2 → Meningitis

How to investigate for chronic meningitis?

- Clinical history
  - ✓ (For animal contact, fever, or previous treatment ..etc)
- Clinical examination
  - ✓ (Fundoscopy “to look for papilledema”, and look for signs of meningeal irritation ex: Kernig's sign)
- Neurological examination
- Blood tests
  - ✓ (CBC, Urea, Creatinine , Liver function tests ..etc)
- Blood culture
- Lumber puncture
  - ✓ Biochemistry → Lymphocytosis, usually clear CSF, high proteins, low glucose.
  - ✓ Microbiology → (Acid Fast Bacilli stain, Gram stain, and CSF culture ‘to identify organism and sensitivity tests”)
- PCR
  - ✓ (Especially if we suspect herpes simplex virus)
- Serology
  - ✓ (For brucella or unusual organisms like syphilis and HIV)
- Imaging: CT
  - ✓ (If we suspect an increase in intracranial pressure, or abscesses, or patient has a complication such as convulsions)

TREATMENT:

TB meningitis → 9-12 months

Pulmonary TB treatment → 6months

TB drugs:

1-Rifampicin

2- Isoniazid

3- Ethambutol

4- Pyrazinamide

Initially, you must give them all, then patient can continue with 1+2 only.

Brucella meningitis → 6 weeks

Brucella Drugs:

1-Tetracyclin

2- Rifampicin

3- Cotrimoxazole

Give 2 drugs out of 3

(Usually Rifampicin and Cotrimoxazole are preferred as they have good penetration power in the blood brain barrier)

***Note that : Rifampicin is used for both TB and Brucella**

Steroids are found to be very effective in case of TB meningitis

Also surgical intervention maybe required (for complications: abscesses and hydrocephalus)

MCQS:

Q1: A drug that is used to treat both Tuberculosis and Brucellosis:

A. Isoniazid
B. Ethambutol
C. Pyrazinamide
D. D-Tetracyclin
E. Rifampicin
F. Cotrimoxazole

Q2: 65 years old Patient presents with fever, night sweats, weight loss over the last 4-5 months The doctor performed lumber puncture. Findings are: lymphocytosis and AFB smear is positive.
Most likely organism is:

A. Mycobacterium tuberculosis
B. HIV
C. Crypotococcus neoformans
D. Brucella Melitensis

Q3: patient in previous case is treated with drugs for at least:

A. 3 months
B. 6 months
C. 9 months
D. 12 months

Q4: HIV patient present with headache and neck rigidity. Capsulated organisms are seen in india ink.
Most likely organism is:

A. Mycobacterium tuberculosis
B. HIV
C. Cryptococcus neoformans
D. Brucella Melitensis

Q5: Patient presented with high fever, vomiting, and neck rigidity. Doctor gave him amoxicillin. After several days patient came back with convulsions. This time the doctor performed a lumber puncture. Findings are → lymphocytosis, negative culture.
What is the cause of the negative culture:

A. viral meningitis
B. Partially treated meningitis
C. Delayed Diagnosis
D. Encephalitis

Q1:E Q2:A Q3:C Q4:C Q5:B

Additional info

- Clinical significance of chronic meningitis?
- Not as easy to diagnose as acute .. Why?
  Atypical symptoms/signs → difficult to diagnose → delay management → more complications → harder management
- Meningitis causing organisms are mostly contagious, infectious, communicable (EX: TB) → hajj is a good chance for communicable diseases to be transmitted → patients must be isolated
- TB is mainly manifested as pulmonary disease, but in some situations it disseminates. Ex: Immunocomprimised patients (AIDS)
- TB= Cellular immunity → we need a strong cellular immunity to localize the infection in the lungs.
- BCG vaccines → for building immunity "especially in children". It is given to prevent TB meningitis.
- TB and Brucella behave like each other. They give similar manifestations. Both are intracellular.
- Tuberculosis and brucellosis are very common in Saudi Arabia
- signs and symptoms of Chronic meningitis (occur over a long period or recurrent)
  - Chronic headache
  - Neck or back pain
  - Change in personality
  - Facial weakness
  - Double vision, visual loss
  - Papilledema
  - Hydrocephalus
- TB has a similar presentation as lymphoma
- TB is a curable disease if you give antiTB for exact duration
- brucella can be seen by gram stain
- Diagnosis of cerebral and meningeal infections:
  1- clinical history
  2- laboratory investigations.
  3- clinical examination.
  4- imaging investigations.

- Laboratory findings:
  a) Collect of 2-5 ml of CSF and checking for the pressure
  b) Bio chemical investigation for :
     1- Total protein.
     2- Glucose level in comparison to the serum glucose level
  c) Microscopy:
     1- Presence of organism
     2- Total white cell count
     3- Differential count mainly for:
        a- Polymorphic
        b- Lymphocytes.

- molecular test cannot be used in case of T.B because of presence of mycolic acid in the cell wall.
- Z-N Stain can show AFB of T.B while modified Z-N can show Nocardia .
- Laboratory diagnosis of cerebral and meningetic Tuberculosis and Brucellosis:
  - Mantoux test, Tuberculin skin test(TST) → not diagnostic, but helpful
  - Chest x-ray for primary focus
  - CSF microscopy for AFB
  - CSF culture an solid medium L.J or fluid medium
  - PCR or other molecular biopsy test for presence of bacterial element
  - Culture of CSF for Brucella
  - Serology for Brucella

- If patient comes with TB and is treated as brucella infection and vise versa (misdiagnosis) → this leads to multi drug resistant organisms
- Difference between meningitis and encephalitis?
  Encephalitis involves the brain tissue → patient presents with focal neurological deficits and personality changes (unlike meningitis)