



Lecture – 6

Chronic Cerebral Infection & Meningitis



Microbiology team 430

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❖ Signs & Symptoms

SYMPTOM	SIGN
<ul style="list-style-type: none"> Chronic head ache Neck or back pain Change in personality Facial weakness Double vision ,visual loss Arm and leg weakness clumsiness 	<ul style="list-style-type: none"> <u>+/-Papilloedema</u> Brudzink or Kerning 'positive signs of meningeal irritation Altered mental status, <u>memory loss</u>, etc. 7th nerve palsy / 3,4,6 Nerve palsy Ataxia <u>Hydrocephalus</u>(water in the brain)

❖ Microbiological Causes

Bacterial (most important)	Fungal	Parasitic	Viruses
<ul style="list-style-type: none"> Tuberculosis Brucellosis Partially treated acute meningitis(because of wrong treatment or wrong dose ... etc) Syphilis Lptospirosis Lyme disease Nocardiosis Cerebral abscesses (specially by gram -ve& gram +ve anaerobic bacilli) 	<ul style="list-style-type: none"> Cryptococcus neoformans Candida albicans (in immunocompromised patients) 	<ul style="list-style-type: none"> Toxoplasma gonodii(most common) Trypanosoiasis Rare causes:Acanthamoe baspp 	<ul style="list-style-type: none"> Mumps Herpes simplex HIV

You Really Should Know That:

The most important causes of chronic bacterial cerebral and meningeal infections in KSA are:

1- Tuberculosis

2- Brucellosis

And that they can be differentiated on the basis of:

- Clinical History
- Occupation
- Clinical symptoms
- Clinical signs in other organs e.g. chest in TB
- Cerebrospinal fluid findings

❖ Brucellosis “Malta fever”

- Common in KSA & affect people who are in contact with domestic animals or those who consume raw milk and milk products.
- It usually presents with: Pyrexia (fever) > 3 weeks. Which sometimes accompanied by night sweating. In between the attacks of fever the patient is not very ill.
- Sometimes it can cause chronic cerebral infection and meningitis.
- The commonest causes in Saudi Arabia is Br.melitensis

❖ Tuberculosis

- Caused by Mycobacterium Tuberculosis.
- The patient usually presents with fever of long duration, when the chest is affected symptoms of cough and coughing of blood (Haemoptoysis) is present.
- In some cases it present as meningitis and cerebral infection presenting with chronic neurological symptoms and signs.

❖ Chronic Cerebral & Meningeal infection properties:

- Can produce: Neurological disability and could be fatal if not treated.
- Have **slow** insidious onset with progression of signs and symptoms over a **period of weeks.**
- Differ from those of acute infection which have **rapid** onset of symptoms and signs.
- **They are usually diagnosed if the neurological syndrome exists for > 4 weeks.**

❖ Diagnosis of chronic cerebral and meningeal infections:

A- History Taking

B- Clinical examination for symptoms and signs

C- Laboratory findings

D- Imaging by x- ray, MRI or ultrasound

❖ Laboratory Findings

- This is mainly related to the laboratory examination of cerebrospinal fluid including:-

- Collect CSF and (check for the pressure level indicating intracranial pressure)
- Bio chemical investigation for:
 - ✓ Total protein
 - ✓ Glucose level in comparison to the Serum glucose level
- Microscopy:

1- Presence of organisms

2- Total white cell count

3- Differential count mainly for: - **A- Polymorphs** **B- Lymphocytes**

❖ CSF finding in chronic cerebral and meningeal infections:

- ▶ Increased CSF pressure indicating increased intra cranial pressure.
- ▶ Increased protein level (presence of inflammatory indicators, proteins & WBC).
- ▶ Reduced glucose level (Normally is 2/3 of serum glucose level), normal in viral infections.
- ▶ Increased total white cell count but **in chronic infection the differential shows lymphocytosis while in acute infections there is increased % of polymorphs.**
- ▶ Gram stain can some time rarely shows causative organism / Z-N Stain can show acid fast bacilli (AFB) of T.B while modified Z-N can show Nocardia / **India ink for Cryptococcus neoforman.**
- ▶ VDRL and other specific serological tests for syphilis.
- ▶ **Culture of CSF for Brucella, T.B.**
- ▶ Wet preparation of CSF for fungal and parasites.

Venereal disease research laboratory (VDRL) test measures antibodies that body may produce if come in contact with the bacteria that causesyphilis. Can be done by using blood or CSF sample.

❖ Laboratory diagnosis of cerebral and meningeal Tuberculosis & Brucellosis:

- **Mantoux test, Tuberculin skin test (TST).**
- Chest x-ray for focus of TB infection.
- **CSF microscopy for acid fast bacilli (AFB).**
- **CSF culture** on solid medium **[L.J]** or fluid medium [MIGT].
- PCR or other molecular biological tests for presence of bacterial element TB and others.
- **Culture of CSF for Brucella & also Serology for Brucella.**
 - ✓ Combination of these findings with clinical history and examination findings.

❖ Treatment

• Tuberculosis:

4 Drugs are used these are:-

- Rifampicin
 - Isoniazid (INH)
 - Ethambutol
 - Pyrazinamide
- } **For 2 month**

Then:-

- Rifampicin
 - INH
- } **For 4-6 month**

• Brucellosis:

Two of the following 3 drugs:-

- Tetracycline
 - Rifampicin
 - Cotrimoxazole
- ✓ Usually Rifampicin and Cotrimoxazole are preferred as they have good penetration power in the blood brain-barrier.

Summary

- The most important causes of chronic bacterial cerebral and meningeal infections in KSA are: TB & Brucellosis.
- TB & Brucellosis can be differentiated through history, symptom, occupation, affected organs & CSF findings.
- **Brucellosis** affects people who are in contact with domestic animals or those who consume raw milk and milk products.
- **Brucellosis** present with **fever (> 3 weeks) & the patient feels ok between fever attacks.**
- **Tuberculosis** is caused by M. tuberculosis, the patient is presented with fever for long time and coughing blood when the chest is affected.
- If the neurological syndrome exists for > 4 weeks it is usually diagnosed as **Chronic** Cerebral or Meningeal infection, in acute infection we have rapid onset of symptoms & signs.
- In **acute infections** there is increased WBC with **predominance of polymorphs**, but in **chronic infection** the differential cell count shows **lymphocytosis.**
- In case of chronic cerebral or meningeal infection you will notice increased intra cranial pressure, increased protein level and reduced glucose level and lymphocytosis.
- Z-N Stain can show AFB of T.B while modified Z-N can show Nocardia and we use India ink for Cryptococcus neoformans.
- Gram stain and culture can help differentiate between bacterial and viral infection, Specially the CSF culture to diagnose Brucella, T.B.
- To Treat TB we use: Isoniazide (INH), Rifampicin, Ethambutol, Pyrazinamide “ 2 months “ then only INH & Rifampicin “ 4 – 6 months “. In case of Brucellosis we use: Rifampicin & Cotrimoxazole.
- Notice that we use Rifampicin to treat both TB and Brucellosis.

Case

- A 30-year-old woman presented with headache, vomiting and fever of (104°F) [40°C] less oriented and attentive. Lateral rectus palsy (abducent nerve is affected) along with bilateral papilloedema.
 - Neck rigidity and Kernig's sign were positive.
 - Chest x-ray showed miliary shadows in both lungs.
 - CSF revealed elevated opening pressure, proteins **248 mg/dl** (normal is 15 to 60 mg/dL), sugar **34 mg/dl** (corresponding blood sugar was 98 mg/dl); 204 cells/ml, **15% polymorphs rest lymphocytes.** CT head showed multiple small enhancing lesions in brain parenchyma.
- ✓ The patient was given **antituberculous** treatment and corticosteroids. She showed significant improvement in all her symptoms after 15 days.