



## Microbiology Practical



*Microbiology Team 430*

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## CASE 1

It is about one week after the Hajj time, Mr. Mohammed Khan; a Pakistan citizen has completed the Hajj holy duty and is preparing to go home.

A day before his travel he present to the emergency department (A & E) at Al Noor Hospital in Makkah because of headache, vomiting and high temperature.

On clinical examination he has a rash on his body. Mr. Khan's relatives who has brought him to the Hospital mentions that Mr. Kahan received vaccination required for Hajj, a day before his travel for Hajj.

Complain:

- 1- Headache → (infectious or noninfectious causes)
- 2- Vomiting → (due to gastric problem)
- 3- High temperature → infection (may be pharyngitis or meningitis)
- 4- Rash → (Allergy or infections)

N.meningiditis is the most common in Hajj.

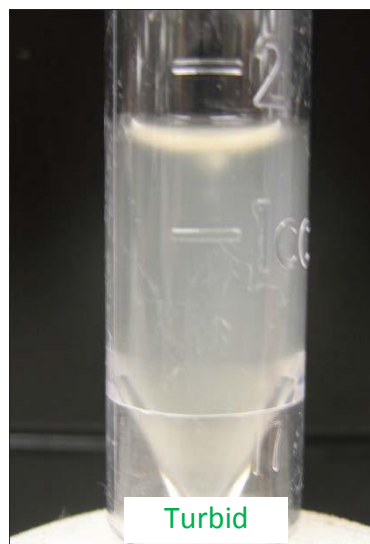
Hypothesis:

- Meningitis
- Head Stroke
- Tumor

CSF	Patient's Result	Normal Range	Notes
Appearance	Turbid	Clear	Could be caused by pus cells or bacteria
WBC and differential	1400 per mm <sup>3</sup> Mainly polymorphnuclear leucocytes (80%)	Few (<5 cells/mm <sup>3</sup> )	Polymorphnuclear → bacteria
Protein	5.0	0.1-0.4 g/L	Very High
Glucose	1.3	3.0-4.5 mmol/L	Low
chloride	110	115-130 mmol/L	Low

The doctor in the emergency department takes a detailed history and conducts a clinical examination. Because of the clinical findings, he decided to do a lumber puncture.

The result of the lumber puncture is shown in the next slide.



### QUESTION 1:

What is your diagnosis?

Acute Pyogenic [ septic ] Meningitis.

### QUESTION 2:

What is the most likely infection responsible? (Select only one)

1. *Mycobacterium Avium*
2. Fungal infection
3. Parasitic infection
4. Viral infection
5. Bacterial infection [ Streptococcus Pneumonia, Neisseria Meningitidis, Haemophilus Influenzae ]
6. Trepanoma pallidum [ Neurosyphilis ]
7. *Mycobacterium tuberculosis*

### QUESTION 3:

What is your justification for your answer to question two?

- 1- The CSF findings: [Turbidity, Leukocytosis mainly Polymorphnuclear, Increased Protein [↑], Low Glucose, Low Chloride ].
- 2- According to history: rapid onset of the disease → Acute infection.

### QUESTION 4:

What further investigation would you like to do at this stage?

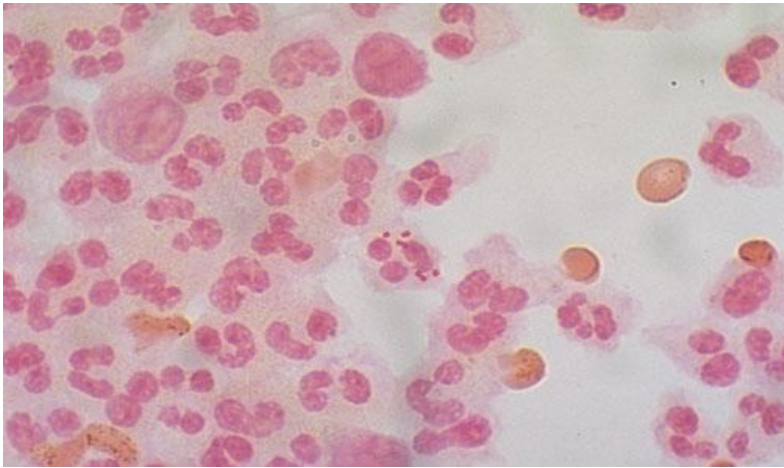
- 1- CSF Gram stain & culture.  
Blood culture (usually done with CSF culture → important because sometimes bacteria are found in blood "due to hematogenous spread" but they don't present in CSF)
- 2- Latex agglutination test → Rapid tests.
- 3- CBC → to check WBC

Since culture needs time to be done, Latex agglutination test (in hours) is done to get a quick result.

Bacteria	Description
S.Pneumoniae	Gram +ve diplococci
N. Meningitidis	Gram –ve diplococci
H. Influenzae	Gram –ve Coccbacilli
Listeria	Gram +ve Bacilli
E.Coli	Gram –ve Rods



### Gram Stain:



### Culture:



#### Description:

Gram negative Kidney shaped intracellular diplococci → N.meningitidis

Intracellular is specific characteristic for N.meningitidis which means that the bacteria appear intracellular because it has been engulfed by pus cells.

**The drug of choice to treat meningitis = Ceftriaxone  
except for neonates and old patients [Listeria] = Ampicillin.**

Drug	Age Group
Ceftriaxone + Vancomycin	Adults
Ampicillin + Gentamicin ( we use Gentamicin to cover E.coli)	Neonates
Ampicillin	Elderly
Cefotaxime + Vancomycin	Children.

Age Group	Organism
Neonates (0 -1 month).	<b>Group B streptococcus</b> + <b>E.coli</b> + Listeria
<b>2 – 18 months (Children).</b>	N.meningitidis + S. pneumonia + <b>H.influenza</b> .
Adults	<b>N.meningitidis</b> + <b>S. pneumonia</b> + <b>H.influenza</b>
Old patients	N.meningitidis + <b>S. pneumonia</b> + <b>Listeria</b>

#### QUESTION 5:

Mr. Khan has received the required vaccination before his travel, how would you explain his infection despite vaccination?

- 1) May be because He took the vaccinations late (a day before Hajj).
- 2) Maybe he is infected with the b serotype which does not have a vaccine.

Vaccination should be received at least 10 days before travel.

## CASE 2

A **10-year old** boy is brought to the emergency department (A&E) at King Khalid Hospital accompanied by his mother.

He **has fever, headache, and vomiting** for the **last 2 days**. Clinical examination confirmed that he has **meningeal irritation**. The doctor decided to do a lumbar puncture.

#### Complain:

- Fever.
- Headache.
- Vomiting.
- Meningeal irritation.

#### Hypothesis:

- Aseptic meningitis (could be due to viral or fungal).
- Tumor → could be excluded because the pt is child.
- T.B.

CSF	Patient's Result	Normal Range	Notes
Appearance	Clear	Clear	
WBC and differential	1200 per mm <sup>3</sup> Mainly lymphocytes (80%)	Few (<5 cells/mm <sup>3</sup> )	Lymphocytes → could be viral
Protein	0.5	0.1-0.4 g/L	About normal
Glucose	2.7	3.0-4.5 mmol/L	About normal
chloride	100	115-130 mmol/L	Low

#### QUESTION 1:

What is your most likely diagnosis?

**ASEPTIC MENINGITIS** (the causative organism is not detected by routine gram stain)

### QUESTION 2:

What is the most likely infection responsible? (Select only one)

1. *Mycobacterium Avium*
2. Fungal infection
3. Parasitic infection
4. **Viral infection**
5. Bacterial infection
6. *Trepanoma pallidum* (Neurosyphilis)
7. *Mycobacterium tuberculosis*

Lymphocyte in CSF is found in both viral infection & chronic infection.

So according to history & CSF findings (protein & glucose) we detect the causative agent either it is viral or mycobacterium tuberculosis

### QUESTION 3:

What is your justification for your answer to question two?

- 1- CSF findings: (clear, leukocytosis mainly lymphocytes, normal protein & glucose).
- 2- History: acute infection.

### QUESTION 4:

What further investigation would you like to do at this stage?

- 1- CSF & Blood culture (negative → aseptic meningitis).
- 2- Rt. PCR (Rapid test for enteroviruses done to identify the virus).
- 3- CBC.

## CASE 3

A 65-year-old is referred from a general practitioner because of **headache, fever, excessive sweating at night, and weight loss** over the **last 4-5 months**. He has **lost his appetite** for food. On examination, there is **neck rigidity**. Laboratory tests including blood count, serum and electrolytes, blood urea, creatinine and blood culture are all normal. The doctors decide to do a **lumber puncture**.

The results of the lumber puncture are shown in the next slide:

CSF	Patient's Result	Normal Range	Notes
Appearance	Turbid	Clear	
WBC and differential	300 per mm <sup>3</sup> Mainly lymphocytes	Few (<5 cells/mm <sup>3</sup> )	Mild increase Lymphocytic leukocytosis
Protein	0.8	0.1-0.4 g/L	high
Glucose	2.0	3.0-4.5 mmol/L	very low
chloride	115	115-130 mmol/L	Normal

### QUESTION 1:

What is your most likely diagnosis?

Chronic infection (most commonly mycobacterium TB)

### QUESTION 2:

What is the most likely infection responsible? (Select only one)

1. Fungal infection
2. Parasitic infection
3. Viral infection
4. Bacterial infection
5. Trepanoma pallidum (Neurosyphilis)
6. *Mycobacterium Tuberculosis*

- Viral & bacterial infections are excluded because they cause an acute infection.
- Fungal infection is excluded according to history – because it usually affects opportunistic Pt.
- Mycobacterium tuberculosis is the commonest cause of T.B

### QUESTION 3:

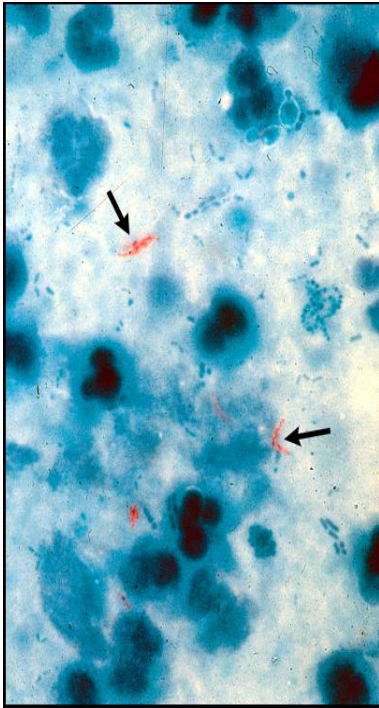
What is your justification for your answer to question two?

- 1- CSF findings: (turbidity, leukocytosis mainly lymphocyte, very high protein, low glucose)
- 2- Blood culture and gram stain are negative.

### QUESTION 4:

What further investigation would you like to do at this stage? (State 3)

- 1- Z-N stain for Acid Fast Bacilli.
- 2- L-J media (special isolated media for TB).
- 3- PPD → Skin test.
- 4- Chest x-ray.
- 5- PCR “ for TB”



Blue background → z-n stain for acid fast bacilli.

Red organism



L-j media