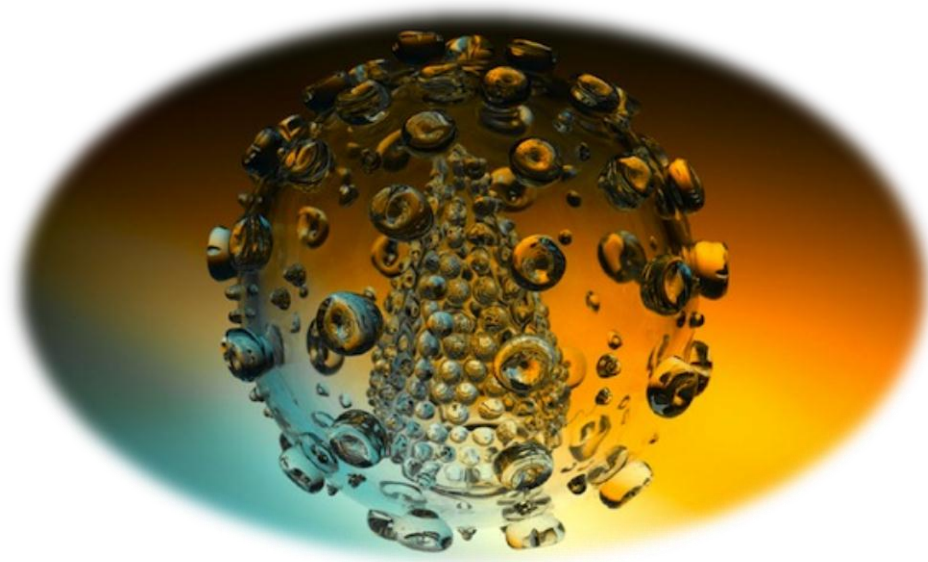




431 Microbiology Team

CNS BLOCK



Microbiology (Practical)

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Done by: Noha Khalil - Eman AlShahrani

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, (see the picture provided). 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.

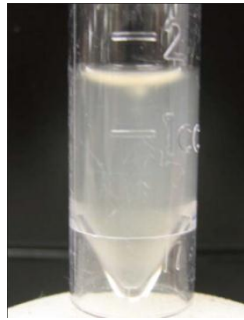
The doctor in the emergency department takes a detailed history and conducts a clinical examination. Because of clinical findings, he decided to do lumber puncture. The result of the lumber puncture is shown below.

The characteristic skin rash (purpura) of meningococcal septicemia, caused by : *Neisseria meningitidis*



CSF	Patient's Result	Normal Range
Appearance	Turbid	Clear
WBC and differential	1400 per mm ³ Mainly <u>polymorphnuclear</u> leucocytes (80%)	Few (<5 cells/mm ³)
Protein	5.0 High	0.1-0.4 g/L
Glucose	1.3 Low	3.0-4.5 mmol/L
chloride	110	115-130 mmol/L

Normal and turbid CSF



Q1: What is your diagnosis?

Septic meningitis (Bacterial) "Acute Pyogenic Meningitis"

Q2: What is the most likely infection responsible? (Select only one)

- Mycobacterium Avium
- Fungal infection
- Parasitic infection
- Viral infection
- **Bacterial infection**
- Trepanoma pallidum (Neurosyphilis)
- Mycobacterium tuberculosis

Q3: What is your justification for your answer to question two?

Because of the acute onset with fever, headache, vomiting and rash. CSF is turbid, Mostly Neutrophils, protein is high and glucose is low.

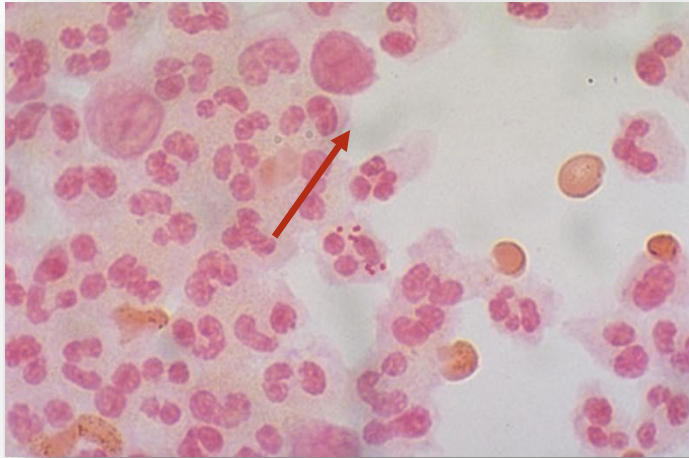
Q4: What further investigation would you like to do at this stage?

1. CSF sample → Gram stain, Culture, Latex agglutination test, sensitivity, and cell count and cell differentiation.
2. Blood culture
3. UNE (urea and electrolyte) (for random blood sugar)
4. CBC (Complete Blood Count)

Q5: Mr. Khan has received the required vaccination before his travel, how would you explain his infection despite vaccination?

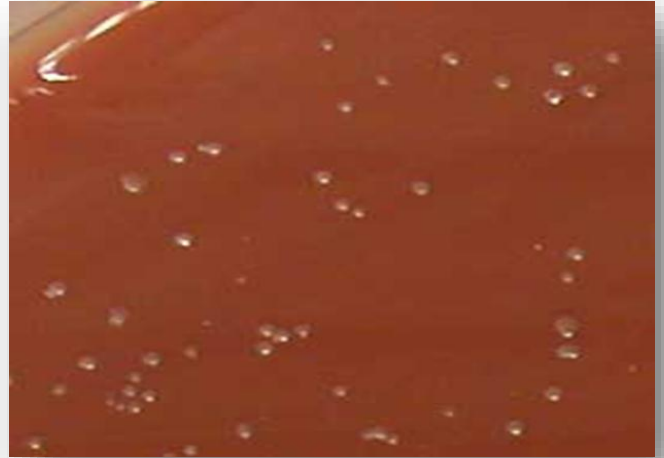
Because he only took the vaccination one day before traveling which is not enough to induce antibodies.

Gram Stain



Gram negative diplococci + pus cells

Culture



Chocolate agar (heated blood agar)

Most likely organism: [*Neisseria meningitidis*]

- Neisseria meningitidis* is oxidase positive
- Neisseria meningitidis* ferment maltose and glucose
- Neisseria meningitidis* is grown on chocolate agar not on blood agar

Drug of choice:

Penicillin

(You can write Ceftriaxone if adult, Cefotaxime if the patient is a child)

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 lumber puncture. "+change in behavior and confusion".

CSF	Patient's Result	Normal Range
Appearance	Clear	Clear
WBC and differential	1200 per mm ³ Mainly <u>lymphocytes</u> (80%)	Few (<5 cells/mm ³)
Protein	0.5 Slightly high	0.1-0.4 g/L
Glucose	2.7 Slightly low	3.0-4.5 mmol/L
chloride	100 Slightly low	115-130 mmol/L

Q1: What is your most likely diagnosis?

بالنسبة لهذا ال Case الدكتور علي عدل عليه وخط ضمن الأعراض Change in behavior and confusion لأن هذا ال Case ما تقدر تقول هو Meningitis أو encephalitis.. لذلك مثل ما ذكرت بالأعلى بغير الأعراض وبيخليها **VIRAL ENCEPHALITIS** .. مع العلم انه بشكل عام ركز على ال Bacterial أكثر..

Q2: What is the most likely infection responsible? (Select only one)

- Mycobacterium Avium
- Fungal infection
- Parasitic infection
- **Viral infection**
- Bacterial infection
- Trepanoma pallidum (Neurosyphilis)
- Mycobacterium tuberculosis

Q3: What is your justification for your answer to question two?

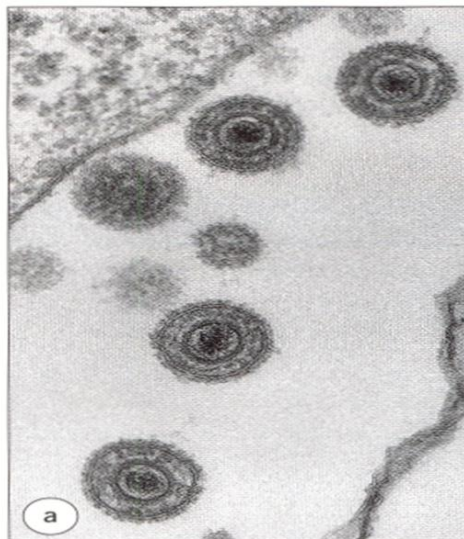
Because the CSF is clear, protein is slightly high and glucose is slightly low. + the acute onset of symptoms (2 days).

Q4: What further investigation would you like to do at this stage?

1. CBC
2. **PCR** (Polymerase chain reaction) → for RNA enterovirus, **herpes** simplex type 2
3. CSF sample → Gram stain, Culture, Latex agglutination test, sensitivity, and cell count and cell differentiation (To confirm and to exclude partial treated meningitis)

Most likely organisms:

[RNA enterovirus or herpes simplex type 2 (for meningitis), HSV-1 if encephalitis]



Microbiological findings:

CSF Molecular testing is positive for Herpes simplex type II

Treatment for Herpes: Acyclovir

Note: Herpes Meningitis: Type 2 / Encephalitis: Type 1

Case 3:

A 59 year old male **farmer** with sudden onset of fever, headache, neck stiffness and confusion.

Peripheral Blood count:

12,800 WBC's/mm³ (73% neutrophils; 12% bands)

Cerebrospinal Fluid:

3520 WBC's/mm³ (100% **neutrophils**)

Glucose: <1 mg/deciliter (**low**)

Protein: 368 mg/deciliter (3.68 g/L) (normal 0.1-0.4) (**high**)

Gray white, **alpha-hemolytic** colonies recovered on sheep blood agar with increased CO₂ from spinal fluid sediment was **Optochin sensitive**



Q1: What is the most probable Pathogen isolated?

[**Streptococcus Pneumoniae**]

Q2: What is your most likely diagnosis?

Bacterial meningitis

Q3: Drug of choice?

Ceftriaxone + Vancomycin

Case 4:

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 doctor decides to do a lumber puncture.

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

CSF	Patient's Result	Normal Range
Appearance	Turbid	Clear
WBC and differential	300 per mm ³ Mainly lymphocytes	Few (<5 cells/mm ³)
Protein	0.8 High	0.1-0.4 g/L
Glucose	2.0 Low	3.0-4.5 mmol/L
chloride	115	115-130 mmol/L

Q1: What is your most likely diagnosis?

Chronic meningitis

Q2: What is the most likely infection responsible? (Select only one)

- Fungal infection
- Parasitic infection
- Viral infection
- Bacterial infection
- Trepanoma pallidum (Neurosyphilis)
- **Mycobacterium tuberculosis**

Q3: What is your justification for your answer to question two?

Chronic duration and old age, Night sweating, weight loss, CSF low glucose and markedly increased protein.

Q4: What further investigation would you like to do at this stage?

(State 3)

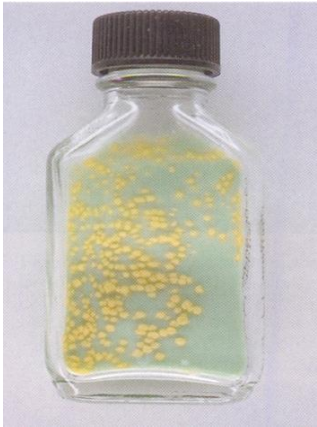
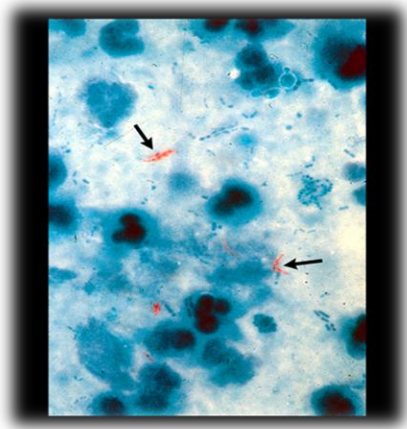
1. CSF sample → Gram stain, **AFB stain (zein neelsen stain)**, Culture, Latex agglutination test, sensitivity, and cell count and cell differentiation
2. Blood culture (LJ Medium).
3. Tuberculin test
4. Brucella titer (because brucella gives similar symptoms)
5. Chest x-ray

Q5: what is the treatment?

- 1- Rifampicin
 - 2- Isonized (INH)
 - 3- Ethambutol
 - 4- Pyrazinamide
- for 2 months

- 1- Rifampicin
 - 2- INH
- for 7-10 months

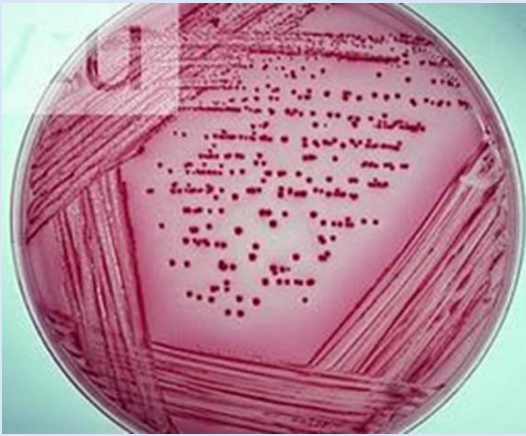
Acid Fast Smear and TB Culture



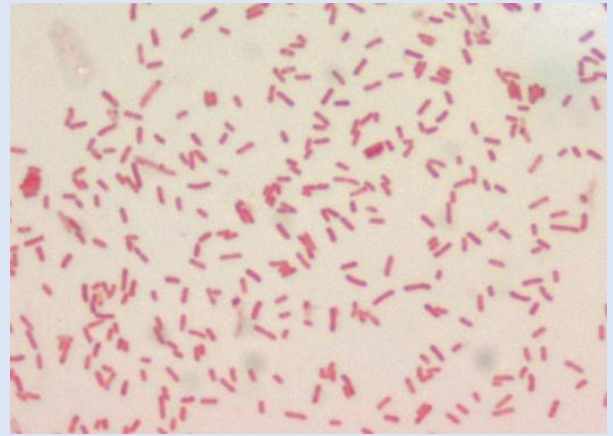
Bacterial meningitis: E.coli

Neonatal meningitis is most common due to colonization of infants with E. coli at delivery

Escherichia coli on MacConkey agar plate, appear pink as they ferment lactose

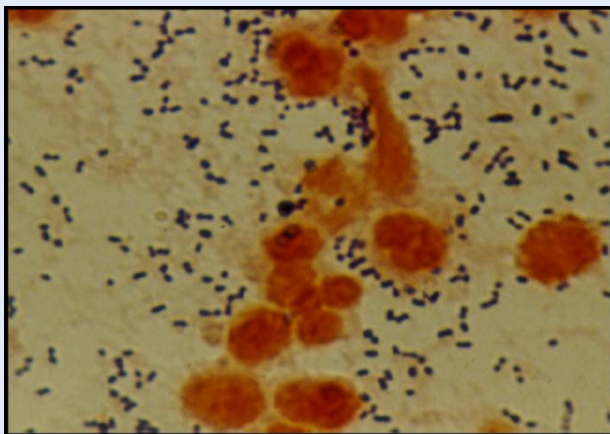


gram negative bacilli

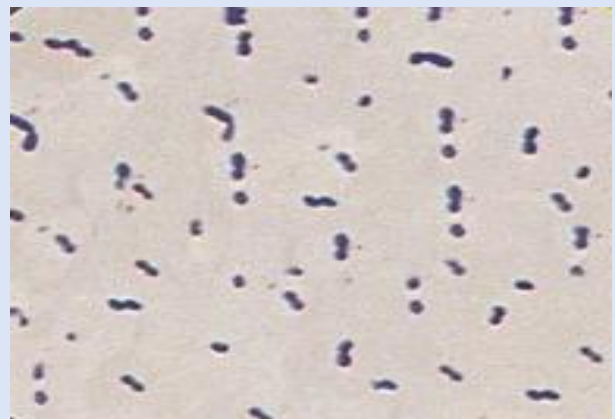


Bacterial meningitis: Pneumococcal Meningitis

Direct gram stain of a CSF deposit shows **gram-positive diplococci** with lanceolate shape and polymorphnuclear leucocytes



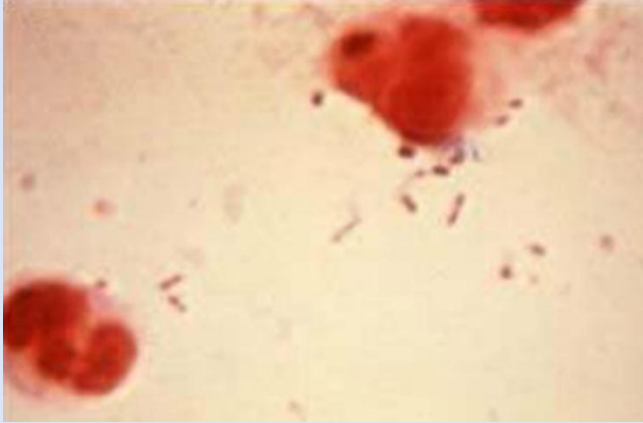
Pneumococci from culture
Gram-positive cocci in pairs; lancet-shaped



Drug of choice: Cefotaxime for E-Coli | Ceftriaxone + Vancomycin for S.P.

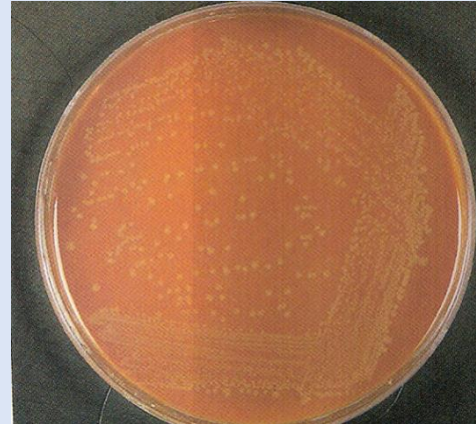
Bacterial meningitis: H. influenzae Meningitis

Gram stain: CSF Deposit



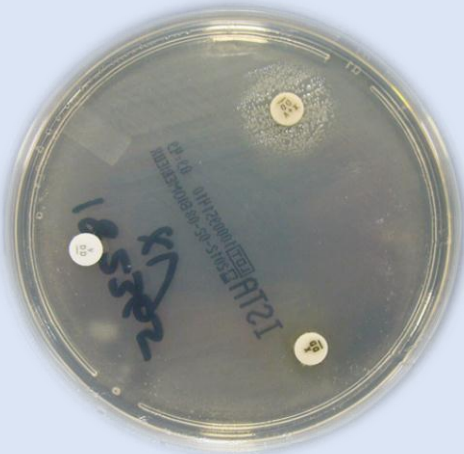
Gram-Negative coccobacilli with many **polymorphnuclear leucocyte**

Culture: H.influenzae on chocolate agar



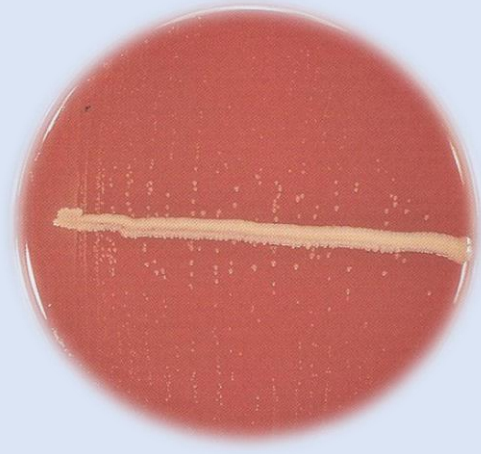
Grow well on chocolate agar at 35°C - 37°C in 5% CO₂, colonies are convex, smooth, pale, grey or transparent

X, V, and X+V factors



H. influenzae: Growth around X-V factors (requires both factors X-V) no growth around X or V alone

Satellitism



Growth on blood agar showing satellitism adjacent to a streak of S.aureus. S.ureus producing surplus factor increasing growth of adjacent H.influenzae