



King Saud University
College of Medicine
Department of Medical Education

“ Absent from school ”

Tutorial TWO

Year Two, Nervous System Block

Curriculum Development Unit

Student's Case

Case 5; 2013

*Rakan Al Mutaairi
432100534*

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The Template of the PBL Cases is designed by Professor Samy A. Azer.

The Student Case and Tutor Guide are created by

- Professor Samy A. Azer
- Dr. Maha Iqbal
- Dr. Ali Somali
- Dr. Sahar Mohammed Aly

Tutorial 2: Discussion of Learning Issues

(60 minutes)

Students: You should start by discussing your “learning issues” that you have identified at the end of tutorial one. You might spend about **60 minutes** on this task. A scribe on the whiteboard is needed to help in this process.

Once you have completed the discussion of your “learning issues”, you might progress to these questions. Spend about **10 minutes** on discussing them in your group. A scribe on the whiteboard will help in this process.

Discussion Questions:

- What is your final hypothesis? Explain why?
- Discuss the pathogenesis of his infection and the possible source for his infection.
- What should the doctor do at this stage?
- Do you know a Nobel prize winner whose work has helped in understanding a physiological principle related to this case. Discuss how his/her work helped in advancement of our knowledge in this area.

In addition to lumbar puncture, Dr. Ghazi uses a wide caliber needle to withdraw blood from Faiz' median cubital vein and arranges for urgent blood tests. Dr Ghazi also arranges for blood culture tests. The later tests require collection of blood under aseptic precautions. Dr Ghazi arranges for the CSF samples to be sent immediately for biochemical and microbiological and culture tests. He also commences Faiz on intravenous (IV) antibiotics, Ceftriaxone, twice daily and IV Fluids, (normal saline and glucose drip). Dr Ghazy arranges for admitting Faiz to the hospital.

Over the next a few hours Faiz blood test results become available. These results are shown below:

Full Blood Count

Blood Test	Patient	Normal range
Haemoglobin	12.5	11.5-13.5 g/100ml
White blood cell count	18000	5,000 -10,000 mm ³
Differential count		
- Segmented neutrophils	83%	50-70%
- Band neutrophils	5%	1-3%
- Eosinophils	1	0-4%
- Basophils	1	0.5-1%
- Lymphocytes	8	12-46%
- Monocytes	2	2-10%
Platelet count	280,000	160,000-500,000 mm ³

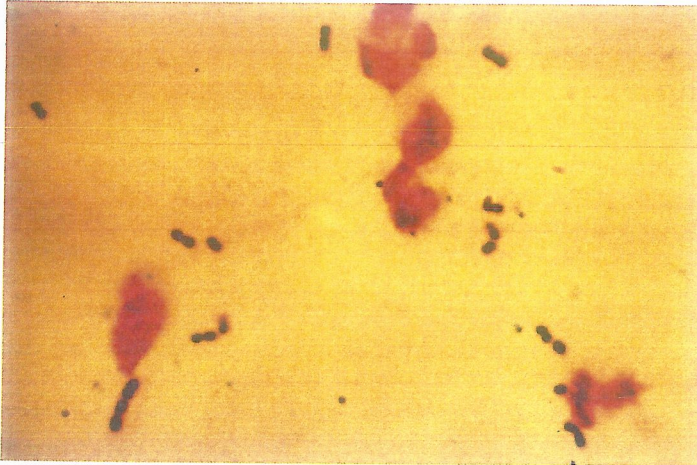
Blood Biochemistry

Blood Test	Patient	Normal Range
Serum Sodium	139	135-145 mmol/L
Serum Potassium	3.5	3.5-5.0 mmol/L
Blood urea	4.5	2.5-8.3 mmol/L
Blood creatinine	0.09	0.05-0.11 mmol/L
Blood glucose	3.9	3.6-5.3 mmol/L

CSF Examination

CSF	Patient	Normal Range
Appearance	Turbid	Clear
Cells	960 (predominantly neutrophils)	0-5 cells per mm ³
Proteins	1.7	0.15-0.35 g/L
Glucose	1.6	2.8-4.4 mmol/L
Pressure	17	10-18 cm H ₂ O (patient is lying on his side)

CSF microbiology



Report: The Gram-stain of the CSF indicates the presence of Gram-positive diplococci. The presence of pus cells supports the presence of infection.

Discussion Questions:

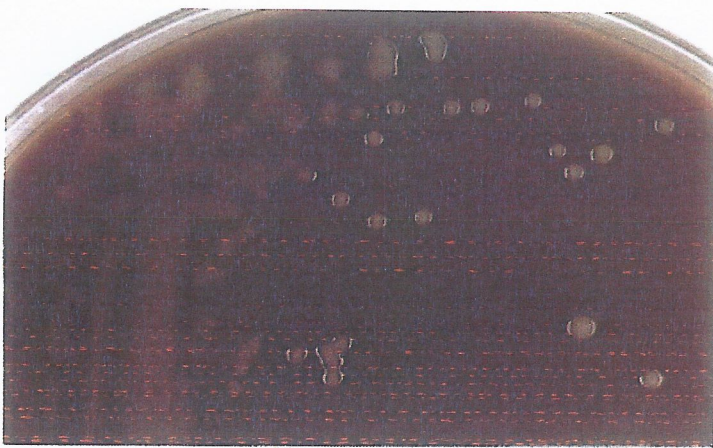
- ▣ Are there words that you do not understand?
- ▣ Summarize key information that you have obtained from this progress.
- ▣ On the basis of the new information, what is your final hypothesis?
- ▣ Discuss your management goals and management options.

Progress 2

(20 minutes)

Over the next 12 hours, Faiz's temperature drops to the range of 38-38.5 °C and there has been no changes in his nervous system examination. The paediatrician consultant re-examines him and decides to continue the same medication with no changes.

Two days later, the results of the CSF and blood cultures confirmed the growth of *Streptococcus pneumoniae*. See culture growth and report below.



Report: *Streptococcus pneumoniae* grown on chocolate agar. This strain of *S.pneumoniae*, appears mucoid when grown on blood agar. The mucoid appearance is related to the capsule production.

Discussion Questions

- ▣ Are there words that you do not understand?
- ▣ Summarize key information that you have obtained from this progress.
- ▣ Construct a mechanism summarizing your final hypothesis with regard to the lesion, the mechanisms underlying Faiz's problems. Provide supportive evidence from history, clinical examination and investigation results.

Case closure:

(10 Minutes)

Over the next 5 days, Faiz shows significant improvement. His temperature is back to normal. He is not irritable or drowsy and his appetite is back to normal. He is discharged from hospital on day 10. All his blood tests are back to normal and he has been afebrile for the last 3 days before discharge. He is allowed to return to school and is asked to review the out-patient clinic in two weeks.

Later follow-up assessment of Faiz shows that he has not developed any complications such as deafness or impairment of the cranial nerves.

Tutor's note:

In the last 10 minutes of the tutorial, you might encourage your group to discuss how they could work better as a group. What are the things they need to change and what things they need to improve? This discussion is very useful and will help the group to function better as they work on the next PBL case.

Challenging and Revision Questions

Tutors: Students could think about these questions on their own as they review the case. They might discuss their answers with their friends.

- Discuss the anatomy and physiology of the meninges and the CSF circulation.
- Discuss the anatomical components of the blood-brain barrier.
- Discuss the mechanisms by which the body maintain its temperature within the normal range.
- Discuss the microbiology, pathology, and pathogenesis of meningitis.
- Discuss how the study of the CSF biochemistry, and microbiology could help in identification of the cause of meningitis.
- Discuss the pharmacology of drugs used in the management of meningitis.

Learning Objectives:

On completion of this PBL package the students should be able to:

1. Discuss the anatomy and physiology of meninges covering the brain and understand the CSF circulation.
2. Discuss the anatomical components of Blood-Brain Barrier, in regard to its function and selection of the antimicrobial treatment
3. Discuss the physiological mechanisms by which our body maintains its temperature within the normal range
4. Discuss the microbiology, pathology and pathogenesis of meningitis.
5. Use basic science to interpret the symptoms, signs and complications of a patient with meningitis.
6. Interpret the CSF examination results from a patient with meningitis.
7. Understand the pharmacological basis of drugs used in the treatment of meningitis.