ROUND 2 NEUROLOGY

Case Study I: (15pts)
Author: Viktória Roháčová

Mrs. Anna, a 44-year-old female, presents to the doctor's office accompanied by her husband. She complains of a strong headache. She claims that this is the strongest headache she's ever experienced, especially because it's completely symmetrical on both sides of her head. It allegedly started today when she wanted to light her morning cigarette. Since the pain began, the patient has vomited twice. Mrs. Anna denies any head injury. She feels tired and complains of a stiff neck. She squints at the doctor because the light in the clinic is too intense for her.

i. The brain is an indispensable organ for the functioning of the human body, and besides the skull, it is protected by the meninges. Describe these meninges (layers) and the spaces between them. (3 points, 1 for each layer and space)

After evaluating the CT results, the doctor concludes that it is bleeding into one of the spaces between the brain meninges—subarachnoid hemorrhage (SAH). For proper treatment, it is important to determine the cause of this bleeding. Since the patient did not describe any head trauma, another cause should be considered.

ii. What is the etiology of non-traumatic bleeding? Provide at least 2. (1 pt)

iii. Which symptoms of SAH occurring in the patient confirm the doctor's diagnosis? (1) What are the risk factors for this condition? (2pts)

In cerebrovascular diseases (including SAH), there is a disturbance of brain functions due to disrupted blood supply. Most spontaneous subarachnoid hemorrhages occur due to the rupture of a blood vessel in the Willis circle.

iv. Explain what the Willis circle is and what its functions are. (structure and function) (3 pts, 1 for definition, 2 for functions)

A key step in diagnosis is a brain examination using CT. The doctor ordered it for our patient, and the result came back positive. In cases of unclear or negative results, further examinations, such as cerebrospinal fluid sampling, can be performed.

v. What is cerebrospinal fluid, and what results do we expect with SAH? (2 pts, 1 for definition and 1 for results)

vi. What are the treatment options for SAH? (2 pts)

vii. What complications threaten patients with SAH? (2 pts)

Case Study II: (20 pts)
Author: Tanvi Toprani

Amanda Wright, an 18-year-old A - A-level student has been brought into her local accident and emergency department one lunchtime by her parents, who have become extremely concerned about her. As you take a history from Amanda, it becomes apparent she has difficulty paying attention to what is going on around her; she is clearly in some discomfort and keeps trying to roll away under the covers. Her parents report that Amanda has been complaining of feeling ‘ feverish ’and ‘headache’ since getting up that morning. She has been sick three times. Her symptoms were initially attributed to a migraine, but she has become increasingly drowsy and irritable as the day has progressed, with symptoms of word-finding difficulties and apparent confusion and disorientation. Routine observations include a temperature of 38.9 °C, blood pressure of 90/60 mmHg, a pulse of 100 beats/min, and oxygen saturation of 98% on room air.

Further history reveals that Amanda has been previously fit and well and takes no regular medications. She has been performing well in her recent coursework and has been offered a place at the university to study physiotherapy. Amanda lives with her parents and younger sister Sheila, and no one else in the family has been unwell. She does not smoke, drinks approximately 6 glasses of wine a week, and has no history of recreational drug use. There is no history of recent foreign travel. On examination, her Glasgow Coma Scale score is 13/15 (eyes open to speech (3), confused speech (4), and obeys motor commands (6)). Her Mini-Mental State Examination score is 21/30 with deficits in orientation, attention and calculation, memory, and naming. Some more detailed testing reveals difficulties with spontaneous speech, comprehension, reading, and writing. There is no evidence of a skin rash. She has neck stiffness on passive neck flexion. Her pupils are equal and reactive to light and the fundi appear normal. There is a full range of extraocular movements. The remainder of the cranial nerve examination is unremarkable. The tone is normal in the limbs and powerful in all muscle groups. Reflexes are present and symmetrical with bilateral downgoing plantars. There are no cerebellar signs.

i. Amanda's clinical tests appear to be deteriorating progressively; how would you stabilize her? (2 pt)

ii. What tests would you consider performing? (2 pt)

iii. Which organisms are commonly responsible for bacterial meningitis in adults, and how would you treat Amanda to cover for bacterial infections? (2 pt)

Amanda's investigations include normal urea and electrolytes, liver function tests, glucose, erythrocyte sedimentation rate, and C - C-reactive protein. Her full blood count showed an elevated white cell count (18× 10 9 /L) with predominant neutrophilia. A lumbar puncture demonstrated an opening pressure of 32 cmCSF (<20 cmCSF), which was turbid. She had 3200 white cells/mm 3 (85% neutrophils), 200 red cells/mm 3, a protein of 2.3 g/L (<0.45 g/L), and a CSF glucose of 1.2 mmol/L (serum glucose of 6.0 mmol/L). Microscopy demonstrated gram-positive cocci. A sample was sent for polymerase chain reaction studies, including for herpes simplex 1 and 2, Ebstein–Barr virus, *varicella-zoster* virus, cytomegalovirus, pneumococcus, and meningococcus, as well as tuberculosis.

iv. State your analysis of the CSF tests (3 pt)

v. How would you treat Amanda? (2 pt)

vi. Which other infections need to be considered if Amanda has been traveling abroad recently? (2 pt)

That evening, the bacteriology lab telephoned to report that the CSF ELISA (enzyme-linked immunosorbent assay) was positive for Strep. pneumonia, and the following day they rang again to say that culture was also positive, with full sensitivity to ceftriaxone. Amanda was discharged home after receiving 2 weeks of intravenous antibiotics and making a good symptomatic recovery. By 4 weeks she had no residual neurological symptoms or signs but was troubled by overwhelming fatigue on minimal exertion; by 6 months this too had resolved.

vii. What is Amanda's prognosis? (2 pt)

Case Study III: (15 pts)
Author: Martin Rehák

A 70-year-old patient named Edward was brought into the emergency department by ambulance, which his wife called. She told dispatch that her husband had what she described as a “weird smile,” where one side of his face didn’t move at all. She freaked out and decided to call an ambulance. The measured blood pressure in the ambulance was 178/99 with a heart rate of 97 bpm, ECG was within normal. When the ambulance arrived, the patient could no longer speak, while understanding the doctor's instructions.

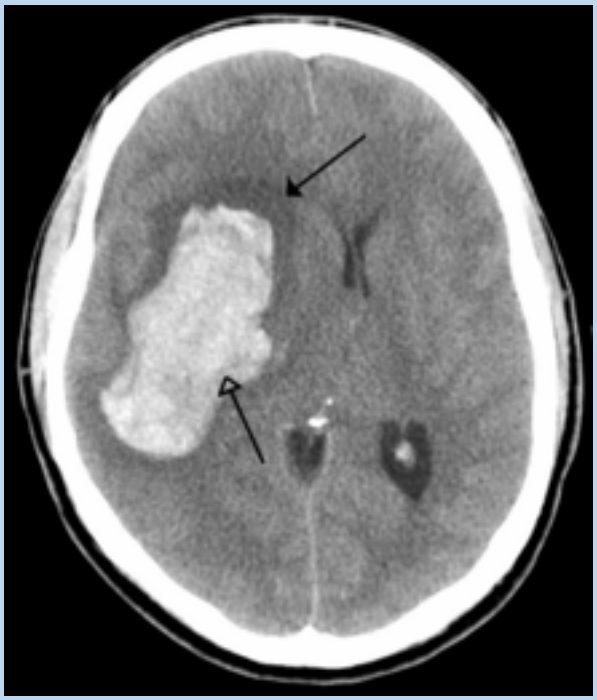
i. What is the likely diagnosis, and what are its most common symptoms? (3 pts)

ii. What types of the mentioned diagnoses do we know? (2 pts)

iii. What tool (mnemonic) could a wife use as a layman? (1 pt)

iv. What is the medical term for a problem with speech? And what types do we know? (2 pts)

The patient was immediately admitted by the doctor and was ordered a CT scan. The CT scan of the patient’s brain looked like this:



v. What can we see in this scan, and what are the arrows pointing at? (2 pts)

vi. By what pathophysiological mechanism did this diagnosis arise? (3 pts)

vii. What other imaging methods could the doctor use for diagnosis (list at least 2)? (1 pt)

After confirming the diagnosis, the patient, already unconscious, was admitted to the intensive care unit and given treatment. The doctor has informed the patient's wife about the diagnosis and possible prognosis. She admitted that her husband did not take his pressure medication for a long time due to side effects and, despite the recommendations of his cardiologist, did not quit smoking. The doctor later discovered in the patient's medical records that he was taking a drug called **Warfarin.**

viii. What is the treatment and possible prognosis? (3 pts)

ix. What other risk factors could partake in this diagnosis? (1 pt)

x. What type of medication did the patient take, and how could it affect the prognosis? (2 pts)