بسم الله الرحمن الرحيم

Faculty of Medicine,
Mu'tah University

كلية الطب،
جامعة مؤتة

Neurosurgery Exam

The Neurosurgery Department, King Hussein Medical Center
Head of department: Dr. Amer Sharbaji
Sunday, 14.05.2012

Notes:

- Theoretically, the number of questions in the exam is 40. However, we only had 38 different questions because two questions were repeated. In this draft, these are questions number 1 & 2.
- We were able to remember 37/38 questions.
- The questions in green (8 questions) are repeated from questions of previous years in Mu'tah University. They are 100% similar to what we got in the exam.
- At the end of the document, there are references to support the answers of some questions.

1. Concerning basal skull fracture involving the anterior fossa, all of the following are true except:

A. Epistaxis
B. CSF rhinorrhea
C. Blindness
D. Raccoon eyes
E. Battle sign

Ans: E

2. Wrong about the management of shunt infections:

A. Immediate replacement of the shunt
B. External ventricular drain
C. Systemic antibiotics
D. Intraventricular antibiotics.
E. Endoscopic third ventriculostomy.

Ans: A

3. Wrong about shunt infections[i]:

A. The most common causative organisms are gram negative

Ans: A

4. General measures that are used to lower intracranial pressure include all of the following except:

A. Head up 30 degrees
B. Avoid hypotension
C. Avoid jugular venous outflow constriction
D. Induce hyperventilation
E. Intubate patient with GCS < 8 or with respiratory distress

Ans: D

5. All can cause dilated none responsive pupil, except:

A. Optic nerve injury
B. Brain stem herniation
C. Oculomotor nerve injury

D. Abducent nerve injury
E. Sympathetic tone loss

Ans: D

6. Intracranial lesion (mass lesion) can present with:
A. Increased intracranial pressure
B. Motor deficits
C. Fits
D. Cranial nerve lesion
E. All of the above

Ans: E

7. An absolute indication for the elevation for depressed skull fracture:
A. Over an eloquent center but with no neurological deficits
B. Compound dirty fracture
C. Sharp angle of fracture
D. Underlying thin non-compressing subdural hematoma
E. Overlying the sagittal sinus

Ans: B

8. A 35 male patient in his third post-operative day (craniotomy for excision of frontal meningioma). Few minutes after the ward round, he was found unconscious and not responding in his bed. The most possible cause for his condition is:
A. Intracerebral hematoma.
B. Hydrocephalus secondary to surgery.
C. Seizure
D. Recurrence of tumor.
E. Brain edema.

Ans: C

9. Which is/are acceptable procedures for the treatment of hydrocephalus?
A. Endoscopic third ventriculostomy
B. Ventriculoperiotoneal shunt
C. Ventricular access device with frequent tapping
D. External ventricular drain
E. All of the above

Ans: E

10. Wrong about epidural hematoma:
A. Most common source of bleeding is the middle meningeal artery
B. Most commonly in the frontal region
C. Can because of a fracture line
D. Lucid interval corresponds to the period of accumulation of blood
E. Occurs mainly in population below the age of 40

Ans: B

11. A 7-year-old child has nausea and vomiting since 2 months. On examination, he has cerebellar signs. He was treated for acute OM 2 weeks ago. The child most likely has:
A. Cerebral abscess
B. Cerebellar Medulloblastoma
C. ?
D. A or B
E. None of the above

Ans: B

12. In the previous scenario, what is the next step in management:
A. Abdominal US
B. Admission and IV antibiotics
C. Brain CT

Ans: C

13. Decrebrate rigidity/posture results because of a lesion in[ii]:

A. Midbrain
B. Pons
C. Cerebellum
D. Medulla oblongata
E. Diencephalon

Ans: A

14. A patient has drop foot and weakness in foot eversion. The cause is a lesion in[iii]:

A. Sciatic nerve
B. Common peroneal nerve
C. Superficial perineal nerve
D. Deep perineal nerve

Ans: B

15. Wrong about L4-L5 disc prolapse[iv]:

A. The most common disc prolapse
B. The nerve root affected is L5
C. Most often, the management is conservative
D. Ankle reflex is absent or decreased in most cases

Ans: D

16. The indications for surgery in disc prolapse include:

A. Cauda equina syndrome
B. Progressive motor deficit
C. Pain affecting the quality of life
D. All of the above

Ans: D

17. A patient comes to the ER 30 minutes after an RTA. He has signs of C7 radiculopathy. Which of the following is appropriate in his management:

A. Cervical immobilization with cervical collar
B. Cervical x-ray
C. Cervical MRI
D. Cervical CT with 3D reconstruction of C1 & C2 (???)
E. All of the above

Ans: E

18. Which is a wrong combination:

A. Corneal reflex: CN V & CN VII
B. Cough reflex: CN X
C. Gag reflex: CN IX & X
D. Vestibuloocular reflex: CN II & III
E. Salivary reflex: CN VII

Ans: D

19. Which of the following cannot be caused by a suprasellar mass:

A. Anosmia
B. Fits
C. Headache
D. Motor deficits

Ans: D

20. Superior cervical sympathectomy can cause all of the following, except:

A. Exophthalmos

B. Ipsilateral facial flushing
C. Miosis
D. Ptosis
E. hemianhydrosis

Ans: A

21. Wrong about a Myelomeningocele:
A. Surgery can reverse the neurological deficits
B. Management include dressing, antibiotics and closure within 48-72 hours

Ans: A

22. All of the following are likely to cause epilepsy, except[v]:
A. Cortical contusion
B. Cryptococcal meningitis
C. Bacterial meningitis
D. Subarachnoid haemorrhage
E. MS

Ans: E

23. On examination of a newborn, he was found to have a tuft of hair on his back. All of the following statements are correct, except:
A. Assure family that everything is OK
B. Surgery is performed before school entry

Ans: A

24. Which one of the following antibiotics can freely cross the blood brain barrier:
A. Penicillin
B. Cefotaxime
C. Chloramphenicol
D. B & C
E. None of the above

Ans: *(Chloramphenicol is 100% correct. I am not sure about Cefotaxime. I searched the internet for ~30 mins and still cannot find a definite answer. Penicillin "poorly" passes the BBB without inflammation because "Hydrophilic antibiotics, such as beta-lactams, penetrate poorly through the BBB, but CSF penetration is significantly increased in the presence of inflammation".[vi] Cephalosporins are beta-lactams. Therefore, if you do not have time to search, then we suggest answering only Chloramphenicol.)*

25. All are measures to reduce increased intracranial pressure in head injury, except:
A. Elevate head of body 30-45 degrees
B. Intubate and ventilate to reach normal ABGs
C. Controlled hypothermia
D. Keep neck straight

Ans:
- Essential Neurosurgery p. 48 and Toronto notes, 2011, neurosurgery page 7, "hypothermia… to 34 degrees Celsius" is of "no proven value in head injury or stroke".
- However, should we ventilate to reach normal ABGs? Should not pCO2 be 30 mmHg? Again, according to Toronto Notes, 2011, neurosurgery p. 6, "You must ventilate to normocarbia (pCO2 35-40 mmHg)".

Ans: C

26. All the following are complications of lumbar disc surgery, except:
A. Discitis
B. Vascular injury
C. Gynecological injury
D. Operation at the wrong level
E. Nerve root deficit

Ans: C

27. One of the following is a primary brain injury:

A. Contrecoup injury
B. Hematoma
C. Brain swelling
D. Concussion

Ans: A

28. All of the following are <u>early</u> complications of head trauma, <u>except</u>:

A. Hematoma
B. Meningitis
C. Epilepsy
D. CSF leak

Ans: C (???) (Not sure if the question required early complications or late complications)

29. The following can cause skull hyperostosis[vii]:

A. Osteoma
B. Meningioma
C. Paget's disease
D. Fibrous dysplasia
E. All of the above

Ans: E

30. Correct regarding chronic subdural hematoma:

A. Can appear either hyperintense, isointense, or hypointense on MRI
B. Associated with brain atrophy
C. Mostly can be drained by Burr holes
D. All of the above

Ans: D

31. Case history of a child with medulloblastoma. He has hydrocephalus. Wrong about the management:

A. Total and axial radiotherapy
B. Chemotherapy
C. Repeat surgery for residual mass
D. Drainage procedure

Ans: D (???)

32. Which nerve fibers share in the control of normal bladder function:

A. Vagal and sacral efferent only
B. Sacral and lumbar only
C. Sacral, lumbar, and descending cortical
D. Thoracic, lumbar and cervical fibers only

Ans: C *(This answer is popularity vote! It is not from a reference)*

33. Wrong regarding diabetes insipidus:

A. Specific gravity of 1.001-1.005
B. Urine output > 250 ml/hour
C. Urine osmolarity > 200 mOSm/L
D. Normal or elevated serum sodium level
E. Normal adrenal function

Ans: C

34. Regarding far lateral prolapsed intervertebral disc, the following are true, except:

A. pain is more severe than medial disc
B. fragmented disc is more common
C. tilting to the opposite side reproduce pain
D. affecting nerve at the same level of the lesion

Ans: C

35. The best modality for evaluation of head injury:

A. CT scan
B. MRI
C. MRA
D. Cerebral angiography
E. Plain film radiographs

Ans: A

36. The following are causes of epilepsy except :

A. Cerebral hematoma
B. Cerebellar hematoma
C. Cortical contusion

Ans: B

37. Regarding neurological assessment which is true:

A. History and clinical assessment are mostly enough to determine the site of the lesion.
B. ?
C. ?
D. ?
E. All of the above

Ans: E

38. Wrong about meningitis:

A. Treatment of meningitis should be deferred until the results of culture and sensitivity are back.

- _____

Table 3. Shunt Complications

Complication	Etiology	Clinical Features	Investigations
Obstruction (most common)	• Obstruction by choroid plexus • Buildup of proteinaceous accretions, blood, cells (inflammatory or tumour) • Infection • Disconnection or damage	• Acute hydrocephalus • Increased ICP	• "Shunt series" (plain x-rays of entire shunt that only rule-out disconnection, break, tip migration) • CT • Radionuclide "shuntogram"
Infection (3-6%)	• *S. epidermidis* • *S. aureus* • *P. acnes* • Gram-negative bacilli	• Fever, N/V, anorexia, irritability • Meningitis • Peritonitis • Signs and symptoms of shunt obstruction • Shunt nephritis (VA shunt)	• CBC • Blood culture • Tap shunt for C&S (LP usually NOT recommended)
Overshunting (10% over 6.5 years)	• Slit ventricle syndrome • Collapse of ventricles leading to occlusion of shunt ports by ependymal lining • Secondary craniosynostosis (children)	• Chronic or recurring headaches often relieved when lying down • Slit-like ventricles on imaging	• CT/MRI
	• Subdural hematoma • Collapsing brain tears bridging veins (especially common in NPH patients)	• Asymptomatic • Headaches, vomiting, somnolence	• CT
	• Apposition and overlapping of the cranial sutures in an infant following decompression of hydrocephalus	• Abnormal head shape	• Clinical • CT
Seizures (5.5% risk in 1st year, 1.1% after 3rd year)			• EEG
Inguinal Hernia (17% incidence with VP shunt inserted in infancy) ± skin breakdown over hardware	• Increased intraperitoneal pressure/fluid results in hernia becoming apparent	• Inguinal swelling, discomfort	• U/S

- i

References:

ii Agonal Sequences in Four Filmed Hangings: Analysis of Respiratory and Movement Responses to Asphyxia by Hanging*
A Sauvageau - Journal of forensic sciences, 2009 - Wiley Online Library
... There is no clear explanation at this time why **decerebration rigidity** (**mid-brain** level impairment) preceded decortication ridigity (cerebral cortex impairment) in two cases out of three. Further research is necessary to achieve a better understanding of this phenomenon. ...
Cited by 12 - Related articles - All 3 versions - Import into EndNote

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Paroxysmal autonomic instability with dystonia after brain injury
JA Blackman, PD Patrick, ML Buck... - Archives of ..., 2004 - Am Med Assoc
... Rigidity and **decerebrate** posturing are seen experimentally and clinically with lesions in the **midbrain**, blocking normal inhibitory signals to pontine and vestibular nuclei. 7 This allows these nuclei to become tonically active, transmitting **...**
Cited by 83 - Related articles - BL Direct - All 5 versions - Import into EndNote

Peroneal Mononeuropathy Clinical Presentation: Physical

- If the lesion is severe, a complete foot drop that spares plantar flexion and foot inversion is noted.
- The gait will be high-stepping with "foot slapping."
- In milder cases, weakness of foot eversion and dorsiflexion may be noted only by asking the patient to walk on his or her heels.

Sourece: http://emedicine.medscape.com/article/1141734-clinical#showall

- [iii]

Table 11. Lateral Lumbar Disc Syndromes

	L3-4	L4-5	L5-S1
Root Involved	L4	L5	S1
Incidence	<10%	45%	45%
Pain	Femoral pattern	Sciatic pattern	Sciatic pattern
Sensory	Medial leg	Dorsal foot to hallux Lateral leg	Lateral foot
Motor	Tibialis anterior (dorsiflexion)	Extensor hallucis longus (hallux extension)	Gastrocnemius, soleus (plantar flexion)
Reflex	Knee jerk	Medial hamstrings	Ankle jerk

Table 12. Differentiating Conus Medullaris Syndrome from Cauda Equina Syndrome

	Conus Medullaris Syndrome	Cauda Equina Syndrome
Onset	Sudden, bilateral	Gradual, unilateral
Spontaneous Pain	Rare, if present usually bilateral, symmetric in perineum or thighs	Severe, radicular type: in perineum, thighs, legs, back, or bladder
Sensory Deficit	Saddle; bilateral and symmetric; sensory dissociation	Saddle; no sensory dissociation; may be unilateral and asymmetric
Motor Deficit	Symmetric; paresis less marked; fasciculations may be present	Asymmetric; paresis more marked; atrophy may be present; fasciculations rare
Reflexes	Only ankle jerk absent (preserved knee jerk)	Knee and ankle jerk may be absent
Autonomic Symptoms (bladder dysfunction, impotence, etc.)	Urinary retention and atonic anal sphincter prominent early; impotence frequent	Sphincter dysfunction presents late; impotence less frequent

[iv]

[v] For more than 20 minutes I have been searching for an answer. The summary of my search based on the reference below are:
Epilepsy is more frequent in MS patients than in the general population. This is “epidemiology” proven. About 3-6 times. Percentage is 5% according to Dr. Muneer Dohaeeta. But:

> “The cumulative incidence of epilepsy by 10 years after diagnosis of MS was 1.9%.” http://onlinelibrary.wiley.com/doi/10.1111/j.1528-1157.1999.tb00772.x/abstract
> “1.70%”:http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowAbstractBuch&ArtikelNr=117350&ProduktNr=234313

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When the causes of epilepsy are mentioned, MS is not mentioned as one of them.
See the refrences below so that you can blame them if our doctors had something else to say:

"In a series of 2,353 multiple sclerosis (MS) patients, 40 subjects presented seizures, with an overall prevalence of 1.70%. Our study on a large MS population confirms that MS is associated to a risk for epilepsy higher than that of the general population." Source:
http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowAbstractBuch&ArtikelNr=117350&ProduktNr=234313

"Epilepsy is three to six times more frequent in MS than in the general population."
http://www.springerlink.com/content/5q58136m44m20v71/

"Conclusions: Our data are consistent with those reported in literature suggesting that the risk of developing epilepsy is threefold higher among MS patients than in the general population."

Epilepsy and Multiple Sclerosis in Sicily: A Population-based Study, 2003,
http://onlinelibrary.wiley.com/doi/10.1046/j.1528-1157.2003.09203.x/full

"Knowledge concerning the relationship between multiple sclerosis and epilepsy is reviewed. Epidemiological studies have **established** that epileptic seizures are more frequent in multiple sclerosis than predicted by chance."

Epileptic and non-epileptic seizures in multiple sclerosis, 2011,
http://www.springerlink.com/content/ekdvw3tpgr4yfylu/

- Does MS cause seizures?
MS is not mentioned as a cause in the following websites:
http://www.nhs.uk/conditions/Epilepsy/Pages/Causes.aspx
http://emedicine.medscape.com/article/1184846-overview

Causes of epilepsy from Harrison's, 17th ed, 2008: They do not include multiple sclerosis

- Table 363-4 Causes of Seizures
-
-

• Neonates (<1 month)	• Perinatal hypoxia and ischemia • Intracranial hemorrhage and trauma • Acute CNS infection • Metabolic disturbances (hypoglycemia, hypocalcemia, hypomagnesemia, pyridoxine deficiency) • Drug withdrawal • Developmental disorders • Genetic disorders
• Infants and children (>1 mo and <12 years)	• Febrile seizures • Genetic disorders (metabolic, degenerative, primary epilepsy syndromes) • CNS infection • Developmental disorders • Trauma • Idiopathic
• Adolescents (12–18 years)	• Trauma • Genetic disorders • Infection • Brain tumor • Illicit drug use • Idiopathic
• Young adults (18–35 years)	• Trauma • Alcohol withdrawal • Illicit drug use • Brain tumor • Idiopathic
• Older adults (>35 years)	• Cerebrovascular disease • Brain tumor • Alcohol withdrawal • Metabolic disorders (uremia, hepatic failure, electrolyte abnormalities, hypoglycemia) • Alzheimer's disease and other degenerative CNS diseases • Idiopathic

Table 21.33	Epilepsy: aetiological factors
Genetic predisposition	
Developmental, e.g. hamartomas, neuronal migration abnormalities	
Hippocampal sclerosis	
Brain trauma and surgery	
Pyrexia	
Intracranial mass lesions, e.g. tumour, neurocysticercosis	
Vascular, e.g. cerebral infarction, AVM	
Drugs and drug withdrawal	
Encephalitis and inflammatory conditions, e.g. herpes simplex, MS	
Metabolic abnormalities, e.g. porphyria, hypocalcaemia	
Neural degenerative disorders, e.g. Alzheimer's	
Provoked seizures, e.g. photosensitivity, sleep deprivation	
Drugs, e.g. ciclosporin, lidocaine, quinolones, SSRIs, interferons, cocaine, lithium, withdrawal of amfetamines, barbiturates	
Alcohol withdrawal	

Summary: According to Kumar (as you can see above), MS is a cause of epilepsy. However, it is not a "Common cause of it" as it only occurs in ~3% of MS patient. The exam question required "which of the following is **most** likely". Therefore, the answer is MS.

[vi] The CSF half-lives of lipophilic agents, such as quinolones, are similar to those in serum and peak concentrations in CSF are achieved relatively quickly. In contrast, the pharmacokinetics of hydrophilic agents (beta-lactams and vancomycin) in CSF often differs from those in serum. In particular, the half-lives of these agents in CSF tend to be extended, and the time to achieve peak concentrations in CSF is delayed. Hydrophilic antibiotics, such as beta-lactams, penetrate poorly through the BBB, but CSF penetration is significantly increased in the presence of inflammation. In contrast, lipophilic antibiotics, such as quinolones, enter the CSF more efficiently and their penetration is not inflammation dependent. The pharmacodynamic properties of antibiotics in CSF are generally similar to those in other body sites; beta-lactam agents and vancomycin are time-dependent, whereas the quinolones and aminoglycosides are concentration-dependent. However, a notable difference from infections in other sites is that quinolones have a short PAE in CSF and need to continually exceed the MBC for maximal effectiveness. Thus, in CSF, quinolones demonstrate features of both concentration-dependency and time-dependency, evidence that the AUC/MBC is an important predictor of effectiveness. With the exception of quinolones, many antibiotics appear to have prolonged sub-MIC effects and longer half-lives in CSF than in serum, suggesting that dosing intervals longer than those used traditionally would be effective in meningitis. However, this requires clinical verification.

Antibiotic pharmacodynamics in cerebrospinal fluid., http://www.ncbi.nlm.nih.gov/pubmed/9827256

Chloramphenicol levels in cerebrospinal fluid in meningitis.

van Niekerk CH, Steyn DL, Davis WG, Heese Hde V.

Abstract

Chloramphenicol was found to cross the blood-brain barrier into the cerebrospinal fluid of children with pyogenic meningitis effectively both at days 2 and 10 of therapy. It is recommended as the drug of choice in the treatment of children with Haemophilus influenzae meningitis.

http://www.ncbi.nlm.nih.gov/pubmed/7404208

Beta-lactam antibiotics are among the most commonly prescribed drugs, grouped together based upon a shared structural feature, the beta-lactam ring. Beta-lactam antibiotics include:

- Penicillins
- Cephalosporins
- Cephamycins
- Carbapenems
- Monobactams
- Beta-lactamase inhibitors

Hyperostosis of the skull

Edit Article

The differential diagnosis for **hyperostosis of the skull** depends on whether it is focal or diffuse.

Diffuse

- Paget's disease of bone
- metastatic disease, especial prostate carcinoma
- chronic, severe anaemia
- hyperparathyroidism
- acromegaly
- osteopetrosis
- hyperostosis frontalis interna : cases 1 & 3
- long term Dilantin™ administration
- genetic diseases (rare)
  - Camurati-Engelmann disease
  - frontometaphyseal dysplasia
  - craniodiaphysial dysplasia

Focal

- meningioma : case 2
- fibrous dysplasia
- Paget's disease of bone
- metastatic disease, especially prostate carcinoma
- esthesioneuroblastoma : only rarely demonstrates hyperostosis.

[vii]

Source: http://radiopaedia.org/articles/hyperostosis_of_the_skull