Paper II: Technical subject

1. Basic Sciences

1.1. Anatomy
- 1.1.1. Anatomy of brain and spinal cord
- 1.1.2. Anatomy of scalp and skull
- 1.1.3. Anatomy of spine
- 1.1.4. Embryology of the nervous system
- 1.1.5. Classification of nervous system
- 1.1.6. Anatomy of cerebral arterial and venous system
- 1.1.7. Anatomy of the brachial plexus and peripheral nerves
- 1.1.8. Miscellaneous: Cerebellopontine angle anatomy; Occipito atlantoaxial complex anatomy; Internal Capsule anatomy; Cavernous sinus anatomy

1.2. Physiology
- 1.2.1. Physiology of CSF circulation
- 1.2.2. CSF in normal and pathological conditions
- 1.2.3. Pain mechanism
- 1.2.4. Concept of blood brain barrier, Cerebral blood flow, Cerebral perfusion and auto regulation

1.3. Pathology
- 1.3.1. Histopathological characteristics of brain tumors
- 1.3.2. Organisms implicated in the CNS infections
- 1.3.3. ICP- pathophysiology of increased ICP

1.4. Microbiology
- 1.4.1. Common CNS infections
- 1.4.2. Organisms in post-craniotomy infections
- 1.4.3. Shunt infections

1.5. Pharmacology
- 1.5.1. Pharmacokinetics of antiepileptic drugs (AEDs)
- 1.5.2. Dosage and side effects of AEDs.
- 1.5.3. Mannitol/ hypertonic sodium chloride and steroids in neurosurgery
- 1.5.4. Antibiotics in neurosurgery
- 1.5.5. Analgesics in neurosurgery
- 1.5.6. Muscle relaxants, sedatives and paralytics in neurosurgery
- 1.5.7. Anticoagulants in neurosurgery

2. General Clinical Neurosurgery

2.1. History of neurosurgery and micro-neurosurgery
2.2. Fluid and electrolytes
2.3. Nutrition in neurosurgery
2.4. Neuro critical care
2.5. Preoperative and postoperative care

2.6. Surgical exposure in neurosurgery
2.7. Phacomatosis
2.8. Fundamentals of basic Neuro anesthesia
2.9. Neuroradiology- imaging modalities and interpretation
2.10. Electroencephalogram (EEG), Transcranial Doppler (TCD) and Evoked potentials
2.11. Operating microscope
2.12. Seizures- classification, diagnosis and treatment
2.13. Brain death- diagnosis and implications
2.14. Use of Gamma knife in neurosurgery
2.15. Robotic surgery
2.16. Stem cells as applied to neurosurgery

3. Principles of Trauma Care

3.1. Pathophysiology of traumatic brain injury
3.2. Head Injury- Operative and non-operative management
  3.2.1. Traumatic intracranial hematomas
  3.2.2. Sequelae of head injury
  3.2.3. Vascular injuries of head
  3.2.4. Penetrating injuries of head
  3.2.5. CSF fistula
  3.2.6. Treatment of dural sinus injury
  3.2.7. Controversies in decompressive craniectomy
3.3. Spinal Injury- Operative and non-operative management
  3.3.1. High, mid and low cervical injuries
  3.3.2. Whiplash injuries
  3.3.3. Thoracic and lumbosacral injuries
  3.3.4. Instrumentation in spine
  3.3.5. Penetrating wounds of the spine
  3.3.6. Use of steroids in spinal injuries
3.4. Guidelines for management of neurotrauma
3.5. Recent advances in neurotrauma
3.6. Cellular basis of injury
3.7. ICP monitoring in cranial pathology

4. Cerebrovascular Surgery

4.1. Subarachnoid hemorrhage (SAH) -perioperative management
4.2. Principles of aneurysm and arteriovenous malformations (AVM) surgery
4.3. Recent advances in aneurysm obliteration (coil vs. clip) - pros and cons of individual modalities and level of evidence
4.4. Newer modalities in endovascular treatment
4.5. Principle of stroke management
4.6. Spontaneous intracerebral hemorrhage (ICH) and intraspinal hemorrhage: principle of diagnosis and treatment
4.7. Carotid artery stenosis

4.8. Principle and steps of carotid endarterectomy and common cerebral vascular bypass surgeries
4.9. Cavernous malformations- diagnosis and treatment
4.10. Spinal AVMs
4.11. Pregnancy and treatment of vascular disease
4.12. Medical management of stroke and cerebral ischemia
4.13. Cerebral protection
4.14. Cerebral venous sinus thrombosis- diagnosis and treatment

5. Neurosurgical Oncology

5.1. Investigations for brain tumors- primary and metastatic, benign and malignant
5.2. Surgery for brain tumors
5.3. Use of stereotaxy, neuronavigation and intraoperative MRI in tumor surgery
5.4. Phakomatosis
5.5. Principles of Chemo- and Radiotherapy and immunotherapy
5.6. Sellar and parasellar tumors
5.7. Orbital tumors
5.8. Clival and other skull base tumors
5.9. Scalp tumors
5.10. Spinal tumors (intra and extramedullary)
5.11. Recent advances in neuro-oncology
5.12. Pseudotumor cerebri

6. Pediatric Neurosurgery

6.1. Hydrocephalus, hydrancephaly, and porencephaly
6.2. Principle of intrauterine neurosurgery
6.3. Neural Tube Defects (NTD) - cranial and spinal dysraphisms
6.4. Chiari malformations
6.5. Dandy Walker malformations (DWM)
6.6. Craniosynostosis
6.7. Arachnoid cysts
6.8. Antenatal diagnosis and treatment of congenital anomalies
6.9. Neonatal intracranial hemorrhage
6.10. Stroke in children, subdural effusion and hematomas
6.11. Pediatric brain tumor: classification, diagnosis and treatment

7. Surgery of the Peripheral Nervous System

7.1. Management of peripheral nerve injury
7.2. Carpal tunnel syndrome and other entrapment neuropathies
7.3. Brachial plexus injury
7.4. Principles of Electromyography/Nerve Conduction Studies (EMG/NCT)
7.5. Nerve anastomosis- principle and treatment

8. Spinal Surgery

8.1. General considerations and biomechanics of spine

8.2. Disc herniations
8.3. Lateral recess syndrome
8.4. Syringomyelia
8.5. Spondylitic myelopathy
8.6. Degenerative disease of spine
8.7. Spinal exposures
8.8. Ossification of posterior longitudinal ligament (OPLL)
8.9. Tuberculosis of spine
8.10. Lumbar spondylolisthesis
8.11. Failed back syndrome
8.12. Scoliosis
8.13. Disc space infections
8.14. Rheumatoid arthritis of spine

9. Stereotactic and Functional Neurosurgery

9.1. Principles of stereotactic and functional neurosurgery
9.2. Surgical therapy of movement disorders and epilepsy
9.3. Neurosurgical aspect of epilepsy
9.4. Miscellaneous: Neurovascular decompression, Sympathectomy

10. Infections

10.1. Antimicrobial use
10.2. Acute bacterial infections
10.3. Parasitic and fungal infections
10.4. Brain, spinal and epidural abscesses
10.5. Subdural empyema
10.6. Investigation and management of post craniotomy fever
10.7. HIV related CNS infections
10.8. Granulomatous lesions
10.9. Infective thromboembolism of venous sinus and cortical veins

11. Pain

11.1. Management of craniofacial pain syndromes, post-herpetic, post-spinal injury, phantom limb pain and other complex regional pain syndromes
11.2. Operations for intractable pain
11.3. Transcutaneous electrical nerve stimulation (TENS)
11.4. Percutaneous spinal epidural stimulations
11.5. Deep brain stimulation (DBS)
11.6. Ablative procedures for pain
11.7. Stereotactic procedures in neurosurgery
11.8. Operations for trigeminal neuralgia, hemifacial spasm and glossopharyngeal neuralgia
11.9. Surgery for spasticity