

## NEUROSURGERY REVISION KEY TOPICS

- 1. Neurological examination**
- 2. Special investigations**
- 3. General care**
- 4. Head Injury**
- 5. Cerebrovascular disease**
- 6. Brain tumour**
- 7. Neurosurgical infections**
- 8. Spinal disease**
- 9. Congenital abnormalities**
- 10. Functional neurosurgery**

### **1. Neurological examination :**

Refer to a standard textbook on clinical neurological examination.

### **2. Special investigations :**

Plain X-ray : skull, C-spine, thoraco-lumbar spine

Myelogram : indications, contra-indications

CT Scan principles : iso-, hypo- and **hyperdense** lesions, contrast enhancement, good for bone and trauma, poor for posterior fossa and intramedullary spinal cord lesions, CT angiography

MRI principles : iso-, hypo- and **hyperintense** lesions, flow void, T1, T2, contrast enhancement, poor for bone and trauma but good for all soft tissue pathology. MR angiography.

### **3. General care :**

Fluid and electrolyte disturbances ie. hyponatraemia , SIADHS and diabetes insipidus, diagnosis and management

Anticonvulsants and treatment of status epilepticus.

Steroid use, indications and complications

Raised intracranial pressure :

Concept of the pressure/volume curve, cerebral perfusion pressure, methods of measuring ICP, hyperemia vs edema , herniation syndromes, RICP treatment, general principles eg patient position, control of pain, empty bladder, no restriction of chest movement; specific treatment eg removal of mass lesions, steroids for edema , mannitol, hyperventilation, drugs eg barbiturates.

#### **4. Head injury :**

General : coma, Glasgow Coma Score, approach to a comatose patient ie ABC, blood investigations esp. glucose !, look for lateralising signs then consider CT scan, treat seizures, consider medical causes eg, metabolic coma, diabetes, drug overdose , C<sub>2</sub>H<sub>5</sub>OH, infections, organ failure, hypertensive encephalopathy. Always remember the collateral history. **Brain death :** criteria and consideration for organ donation.

Blunt head injury vs penetrating head injury ( stab and gunshot )

Diffuse head injury vs focal injury.

Skull fractures : Open vs closed, linear #, depressed #, base of skull #, growing skull #

Haematomas ; Traumatic SAH, extradural, subdural (acute vs chronic), intracerebral and intraventricular haemorrhage.

Diffuse head injury : concussion, diffuse axonal injury

Subdural hygroma

Child abuse

#### **5. Cerebrovascular disease :**

SAH and aneurysms, arteriovenous malformations, spontaneous intracerebral haemorrhage and stroke.

Aneurysmal SAH : clinical features, grading SAH, investigations (ie. CT scan, CSF, MRA, CTA, DSA), general management ie. bed rest, analgesia, neuro-observations, BP control, electrolyte management, calcium channel blocks, stool softeners. **specific problems :** rebleeding, hydrocephalus and vasospasm. : diagnosis and management. **aneurysm management :** conservative vs clipping vs coiling.

Arteriovenous malformations : presentation : haemorrhage (ICH, SAH), seizures, mass effect, ischemia, headache, bruit (eg dural avm), increased ICP (eg hydrocephalus in pediatric malformations). Treatment options : observation vs surgery vs radiosurgery. **carotid-cavernous fistula :** clinical features, diagnosis and treatment.

Spontaneous ICH : primary (hypertensive) vs secondary, position of haemorrhage ( ie lobar / putamen / thalamic / brainstem / cerebellar ) management of hypertensive ICH, medical vs surgical. Investigation of secondary (non-hypertensive haemorrhage)

Ischemic stroke : embolic vs thrombotic. Regarding embolic stroke, role of carotid stenosis, diagnosis and medical vs surgical treatment thereof.

## **6. Brain tumour :**

General principles : presentation ie raised intracranial pressure, seizures progressive neurological deficit, changes in mental state, endocrine disturbances (pituitary pathology)

Classification ; Primary vs secondary

Secondary tumours : metastases are the most common brain tumour. “metastatic” work up to look for primary disease, management : **medical**, steroids, anticonvulsants. **radiotherapy, surgery** ( indications, diagnosis unknown, symptomatic or life threatening, primary disease controlled or life expectancy reasonable, solitary lesion).

Primary tumours :

Gliomas : most common primary tumour. types : astrocytoma, oligodendrolioma, ependymoma. Grading of astrocytomas, broad principles of treatment ie medical, surgery, radiotherapy, chemotherapy,

Meningiomas : usually benign and slow growing, common, treatment : observation, surgery plus or minus radiotherapy.

Vestibular schwannoma (acoustic neuroma) : symptoms and signs, investigations, treatment, conservative vs surgery (radiosurgery), link this tumour up with the disease neurofibromatosis

Pituitary tumours : NB appreciate the anatomy and physiology of the hypothalamic-pituitary axis !! Secretory vs non-secretory tumours. general clinical symptoms and signs, specific syndromes ie acromegali, Cushing's disease, prolactinoma. Medical and surgical treatment of pituitary disease (general principles)

Posterior fossa tumours in children :

Four common types 1. Medulloblastoma 2. Ependymoma 3. Cerebellar pilocytic astrocytoma 4. Brainstem glioma. General principles of clinical presentation and treatment. Hydrocephalus, surgery, radiotherapy, craniospinal metastatic disease.

Spinal tumours :

Clinical features, radiological investigations, treatment : surgery/radiotherapy.

Pathology : 1. Extradural disease : metastases

2. Intradural disease :
  - Extramedullary - meningioma , neurofibroma
  - Intramedullary - astrocytoma, ependymoma

## **7. Infections :**

Brain abscess, subdural and extradural empyema, parasitic infections, tuberculosis. AIDS.

Abscess, SDE, EDE :

Etiology: ENT infections ie sinusitis and mastoiditis, hematogenous spread ie congenital heart disease, endocarditis, lung infections, penetrating trauma, post surgical infection.

Principles in treatment: drainage of the abscess, treatment of the primary disease and prolonged antibiotic therapy.

Neurocysticercosis : infection by the larval stage of Taenia Solium. Multiple lesions, may be calcified or cystic. often ring enhancing, may cause hydrocephalus. Treatment: Medical : Praziquantel or Albendazole

Surgical : Hydrocephalus, mass lesions, diagnosis unsure.

Tuberculosis : neurosurgical involvement is mainly to confirm the diagnosis or treat hydrocephalus

AIDS : Aids is a disease that will come more on the forefront in the future. Neurosurgical involvement is common. Mass lesions found : toxoplasmosis, cryptococcus, fungi, tuberculosis, other lymphoma, PML (progressive multifocal leukoencephalopathy)

## **8. Spinal disease :**

Degenerative spinal disease, spinal trauma, spinal infections :

Degenerative spinal disease : most common sites are cervical and lumbar.

Cervical disease: Clinical features : myelopathy vs radiculopathy, special investigations: plain X-rays and MRI, treatment : indications are pain not responsive to conservative management and neurological deficit especially if progressive. Surgery involves either an anterior or posterior surgical procedure depending on the pathology and involved anatomical level/levels.

Lumbar disease:

Lumbar spinal stenosis. Clinical features ie neurogenic claudication. Treatment ie decompression most commonly a laminectomy

Lumbar disc prolaps : Radiculopathy, clinical features treatment ie conservative eg bed rest, analgesia, physiotherapy, surgery ie discectomy.

Cauda equina syndrome is a neurosurgical emergency. Clinical features (pain, paraparesis/plegia, bladder and/or fecal incontinence) Requires **urgent** neurosurgical referral.

### **Spinal trauma :**

Principles of the management of a spinal injury ie. ABC, immobilization, maintain BP, maintain oxygenation, methylprednisolone, clinical examination, radiological identification of pathology (X-ray C-spine C1/T1 , open mouth view, thoracic and lumbar AP and lateral views if fracture suspected ) Urgent MRI required if : incomplete lesion, neurological deterioration noted, no bony pathology noted in presence of neurological deficit ( ? disc prolaps or epidural haematoma) . Surgical treatment is specialized and taken care of by the orthopedic/neurosurgical specialities.

### **Spinal infection :**

Spinal epidural abscess is a **neurosurgical emergency**. Clinical features : Back pain, fever, spinal tenderness, neurological deficit. Risk factors : DM, IV drug abuse, immunocompromised state. Treatment : urgent drainage.

## **9. Congenital abnormalities :**

Common abnormalities include arachnoid cysts, craniofacial abnormalities eg synostosis, encephalocele, Chiari malformations, Dandy-Walker malformation, aqueduct stenosis, spina bifida (dysraphism), tethered cord syndrome.

**Hydrocephalus** : communicating vs non-communicating. Clinical features in children vs adults. Treatment options : conservative vs surgical, shunt/ ventriculostomy.

**Spina bifida** : spina bifida occulta vs aperta(open). Tethered cord syndrome, clinical features, radiological investigations and treatment. Myelomeningocele, clinical features , treatment and comprehension of the long term multidisciplinary involvement in the care of these patients ( neurosurgery, urology, orthopedics, pediatric surgery, physiotherapy and occupational therapy, psychological support)

## **10. Functional neurosurgery :**

Neurosurgery also involves the treatment of pain (eg trigeminal neuralgia and other chronic pain syndromes), movement disorders (eg parkinsonism), the surgical treatment of epilepsy , the treatment of spasticity etc. Understand the concept of “functional neurosurgery” and appreciate some of the common conditions ie trigeminal neuralgia, parkinsonism, temporal lobe epilepsy.

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