Acute Neurology – Stroke

• Is the patient having a stroke?
• Is there an alternative diagnosis?
• What type of stroke is it?
• How severe is the stroke?
• Where is the lesion?
• What is the cause?

• How do we manage the patient?
Acute Neurology – Stroke

• Is the patient having a stroke?
  ➢ Sudden onset
  ➢ Focal symptoms & signs
  ➢ Negative symptoms
Acute Neurology – Stroke

• Is there an alternative diagnosis?
  ➢ Migraine aura
  ➢ Focal epilepsy
  ➢ TGA
  ➢ Metabolic / Toxic
  ➢ Structural
  ➢ MS
  ➢ Labyrinthine
  ➢ Functional
Acute Neurology – Stroke

What type of stroke is it?

- Infarct
  - Ischaemic
  - Embolic
  - SAH
  - Venous
- ICH

How severe is the stroke?

- GCS
- NIHSS

What is the Cause?

- Large artery atherosclerosis 50%
- Atrial Fibrillation 25%
- Small vessel 20%
- Others (Young onset)
Acute Neurology – Stroke

• Where is the lesion?

➢ TIA
➢ Lacunar
➢ Posterior circulation (POCS)
➢ Total anterior circulation syndrome (TACS)
➢ Partial anterior circulation syndrome (PACS)
Early CT Findings

Early CT scan changes are seen in 60% within 6 hrs of stroke onset.

- Cortical sulcal effacement
- Loss of the insular ribbon
- Blurring of the grey-white interface
- Obscuration of lentiform nucleus
- Hyperdense artery sign (intravascular thrombus)
Axial cranial CT scans: A 60-year-old man with a hyperacute ischaemic stroke (2 h post-ictus) with dense thrombus in his right M1 (A).

Shelley Renowden Pract Neurol 2014;14:77-87
Axial non-contrasted CT head scans (A–E) and a coronal CT angiogram reconstruction (F) in a 60-year-old man with a hyperacute ischaemic stroke.
Axial non-contrasted CT in a 65-year-old man with left cervical internal carotid artery occlusion and a right hemiparesis.
Acute Neurology - Stroke

**Major Threats to Life**

*Transtentorial herniation*
- Massive hemispheric infarction
- Massive haemorrhage
- Vasogenic oedema
- Extension
- Intraventricular haemorrhage (ICH or SAH)

*Aspiration Pneumonia*

*Cerebellar Infarction / haemorrhage*

*Hydrocephalus*

*Epilepsy*

*Acute MI / DVT & PE*
Acute Neurology – Stroke

• Acute Management

  • Physiological parameters
    ➢ Hypoxaemia
    ➢ Blood pressure
    ➢ Hyperglycaemia
    ➢ Pyrexia
    ➢ ICP
    ➢ Cardiac
    ➢ Dehydration
    ➢ Infection
    ➢ Thrombotic (DVT)
Acute Neurology – Stroke

• Acute Management

• Is the patient a candidate for reperfusion?
• iv thrombolytic therapy with altepase
• ia mechanical thrombectomy

Rapid determination of eligibility (<3 hrs; 3-4.5 hrs)

• tPA iv (0.9 mg/kg up to 90 mg). 10% bolus dose given in resus and infusion over 60 mins started

Ischaemic stroke causing neurological deficit
Onset <4.5 hrs before beginning Rx
Age >18
Acute Neurology - Stroke

Contra-indications

• Haemorrhagic stroke
• Severe stroke NIHSS>25
• Minor/improving deficit
• Seizure at onset
• SBP>185 or DBP>110
• Glucose <2.77 or >22.15
• Low platelets, bleeding diatheses
• Prior stroke <3/12
• Prior stroke and diabetes
• Heparin within 48h
• Oral anticoagulants
• Platelets <100
• Recent severe bleeding
MCA reperfusion after thrombolysis

Occluded Left MCA
Intracerebral haemorrhage secondary to tPA treatment
Acute Neurology – Stroke

• Acute Management

• Is the patient a candidate for reperfusion?
• iv thrombolytic therapy with alteplase
• ia mechanical thrombectomy

  ➢ Antithrombotic
  ➢ Thrombolysis
  ➢ Neuroprotection
  ➢ Surgery
  ➢ BP Control
  ➢ ICP management
  ➢ Secondary protection
Acute Neurology - Stroke

OTHER ADVANCES

- Basilar artery occlusion
- Ultrasound enhanced thrombolysis
- Angioplasty and Stenting
- Combined iv and ia Thrombolysis
- Glycoprotein IIb / IIIa Antagonists
Acute Neurology – Intracerebral Haemorrhage

10-15% of new strokes
30 day mortality 30-50%
20% regain independence at 6/12

Causes

- Chronic hypertension (50%) – deep territory
- Cerebral Amyloid Angiopathy (20% >70y) - Cortical
- Anticoagulation (17% but increasing)
Axial cranial non-contrasted CT images (A and B) in a 50-year-old hypertensive woman demonstrate a typical hypertensive parenchymal haemorrhage in the right basal ganglia.
Axial cranial non-contrasted CT scans in a 75-year-old woman with recurrent intracranial haemorrhage (ICH).

Shelley Renowden Pract Neurol 2014;14:159-175
Axial cranial non-contrast CT images in a 60-year-old man presenting with sudden onset left hemiparesis.
Acute Neurology – Intracerebral Haemorrhage

Controversial

BP Control
AED
ICP monitoring
Extraventricular drain
Reduce haematoma expansion – Procoagulant
Surgery
Minimally invasive surgery / Endoscopic
Intraventricular thromolysis
Acute Neurology – The future of stroke care 2015

2 Types of Stroke Centre

1) CT scan-only Primary Stroke care

2) Comprehensive Stroke Centre
   • Thrombectomy
   • SAH
   • Aneurysm
   • AVM
   • Neurosurgeon
Acute Neurology – Status epilepticus

At least 5 minutes of continuous seizures or two or more seizures between which time there is incomplete recovery of consciousness

Convulsive – Non-Convulsive
Impaired Consciousness
Generalised – Focal / Localised

Causes
Cerbrovascular
Alcohol / Drugs / Toxins / Metabolic
Drug reduction / Withdrawal
Infection
Anoxia
Trauma
Others – Genetic / Chromosomal
Mitochondrial
Structural
Autoimmune / Inflammatory
Acute Neurology – Status epilepticus

Autoimmune - Encephalitis ± Paraneoplastic
i) Intracellular – Hu, CRMP-5, Ri, Yo, Ma
ii) Cell Surface - NMDA, VGKAb complex, AMPAR, GlyR, GABA

Mitochondrial – POLG, Valproate induced

Structural – Focal cortical dysplasia

Neuroepithelial tumours
Management of Status Epilepticus

General Measures

- Assessment of cardiopulmonary function. Tracheal intubation if indicated
- Give glucose +/- thiamine
- Institute regular monitoring - HR, BP, Coma scores, temperature etc.
- Acidosis, hyperpyrexia management
- ITU / HDU – LONG TERM ITU MANAGEMENT
Acute Neurology – Status epilepticus

Treatment

Acute Established  Refractory  Super refractory

**Acute**
Usual – benzodiazepines (LZP 4mg iv; rectal / iv DZP)
Now  -  Buccal or Nasal Midazolam
   Water soluble at pH3
   Rapidly absorbed through buccal mucosa
   Becomes lipid soluble
   More effective seizure control within 10 minutes than DZP
Acute Neurology – Status epilepticus

Treatment

Acute Established Refractory Super Refractory

Established
Usual – Phenytoin and / or Phenobarbitone – Loading , maintenance
Now - iv Valproate or iv Levetiracetam
    (Lacosamide)
    Less cardiovascular toxicity, less sedating
    VPA encephalopathy and coagulation defects
    60% stop seizures 40% continue
Acute Neurology – Status epilepticus

Treatment

Acute Established Refractory Super refractory

Refractory

Aim – Anaesthetise, Burst suppression – Why? How long?

Thiopentone – Accumulates, prolonged action, Hypotension, Bowel, pancreatic, hepatic toxicity, Hypothermia
MDZ - Hypotension, Hepatic, Acute tolerance
Propofol - Propofol infusion syndrome
Acute Neurology – Status epilepticus

Super Refractory (NORSE)

Death 35%; Severe deficit 13%, Good recovery 35% (MAY BE LATE)

ITU Care – Specialist Units

• Monitoring

• Continuing Anaesthesia – How long, Cycle, Risks

• Conventional AEDs – DHP, Pb
  
  VPA, Leviracetam, Topiramate, Lacosomide, perampinil

• Mg infusion

• Steroids / Ig / Pl Ex

• Physical – Ketogenic diet, Vagal Nerve stimulation, ECT

• Ketamine

• Hypothermia
Post anoxic myoclonus
Acute Neurology – Status Epilepticus

Complications

Cardiopulmonary
- Aspiration pneumonia
- ARDS
- Pulmonary emboli
- Myocardial Ischaemia
- Cardiac Arrhythmia

Temperature

Electrolytes

Metabolic Acidosis

Cerebral damage

Acute tubular necrosis

Rhabdomyolysis

Hypoglycaemia

Lactic acidosis

Multiple organ dysfunction

Disseminated intravascular coagulation
Acute Neurology - Meningitis

Meningitis – Changes in Epidemiology

• Development of pneumococcal Ab resistance to penicillin

• Routine vaccination against HI type b and 7 serotypes of S. pneumoniae

• Vaccination against serotype C meningococcus (now including A,C,Y,w-135)
Acute Neurology - Meningitis

Lumbar Puncture

Critically Important

i) To confirm diagnosis
ii) To identify causative organism
iii) To test Ab sensitivity & rationalise treatment
Acute Neurology

Meningitis

CT Scan Prior to Lumbar Puncture

- Papilloedema
- Depressed level of consciousness
- Focal neurological deficit
- Known intracranial mass lesion
- AIDS or other immunocompromised state
- Seizures
**Figure 64-1** Testing for meningeal irritation. (A) Kernig's sign. (B) Brudzinski's sign.
Acute Neurology

Acute Meningitis

Adults – Empirical

Ceftriaxone

± Vancomycin (for resistant strep)
± Ampicillin (for Listeria)
± Dexamethasone (10mg iv & 6hrly for 4 days)

In any patient sent for CT with suspected meningitis:

Adjuvent dexamethasone - 10mg iv 15-20 mins before or with the first dose of antibiotics and given for 4 days)
Acute Neurology

Acute Meningitis

Strep Pneumoniae (14 days)
- Sensitive: Penicillin G / Ampicillin, Cephalosporin
- Mild resistance: Cephalosporin, Meropenem
- Resistant: Cephalosporin + Vancomycin

Neisseria meningitidis (7 days) – young adults. Highly infectious
- cephalosporin
- Contact / Household prophylaxis: Rifampicin 600mg 12hrly 2days

Listeria / Gram Negative
(21 days)
Acute Neurology

Acute Encephalitis

Evidence of diffuse or focal involvement of the parenchyma

- Acute viral encephalitis
- Autoimmune response against neuronal surface or intracellular antigens
- Post infectious encephalitis / myelitis
Acute Neurology

Acute Encephalitis – Viral
 HSV – 10-15%; type I & II

- Headache, fever, altered mental state
- Virus infects neurons, glia & ependymal
- Orbitofrontal cortex and temporal lobes
- Temporal lobe – seizures, speech disturbance
- PCR 98% accurate (occ negative early in disease)
  - Yield falls to 21% after 2 weeks of treatment
- Acyclovir 10 mg/kg every 8 hrs (3/52)
  - Nephrotoxicity (slow infusion, ensure patient hydrated)

Mortality reduced from >70% to 14% but 30 % residual deficit
Acute Neurology

Acute Encephalitis – Autoimmune

Limbic, brainstem or cerebellar

Ab against intraneural antigens:

Ab against neuronal surface receptor
Acute Neurology

Acute Encephalitis – Post Infectious Encephalitis

Acute monophasic demyelinating illness occurring within 2-4 weeks of viral or other illness
Acute haemorrhagic leukoencephalopathy

Shiva Kumar R., and Abraham Kuruvilla Neurology
2009;73:e98