• Approach to a neurology case

• Understand where the lesion is

• Cases

• Common neurological diseases
You need to know....

- basic concepts
- how the nervous system is organised
- what symptoms/signs are caused by which bits of the NS
- how to take a neurological history
- how to perform a focused neurological examination
- common diseases
Neurological Approach

- where is the lesion?
- what is the lesion?
What?
- history
- (examination)
- investigations

Where?
- history
- examination
- (investigations)
History

- onset
- course
- associated symptoms
- relevant past history/drugs/FH
- social
vascular
tumour
degenerative
inflammatory

symptoms

Time
Common Problems

- mobility/gait disorders
- hemiparesis/stroke
- tremor cerebellar/extrapyramidal
- seizure/LOC
- headache
Case 1

- 75 year old man
- Weakness

- Diagnosis?
Diagnosis?

- Brain tumour
- Stroke
- Multiple sclerosis
- Cord compression
- Motor neuron disease
- Lumbar radiculopathy
- Lumbar plexopathy
- Peripheral neuropathy
- Myasthenia gravis
- Myopathy
Motor cortex
Lesions along primary motor pathway → weakness or paralysis
**UMN lesion** - no wasting
- ↑ tone, clonus
- weakness (pyramidal)
- ↑ reflexes
- extensor plantars

![Diagram](image)

- Cerebellum
- Basal ganglia
- Sensation

eg MS, MND
Case 1

75 year old man with 1 week history of left sided weakness

Sudden onset

O/E

brisk left sided reflexes

pyramidal weakness

increased tone

upgoing left plantar
Case 1

- Diagnosis
  - UMN signs - localise to ??
  - Brain or spinal cord
  - Arm and leg - brain or cervical spine

Diagnosis

Stroke

What do you need to know about stroke?
Case 2

- 64 year old woman
- 12/12 tripping and less steady on her feet
- Tingling in her hands
- Dropping objects
- Urgency of urination
Case 2

- Long history of neck pain
- Osteoporosis
- Diabetes
- Metformin
- Statin
- paracetamol
Case 2

- Increased tone in all four limbs
- Brisk reflexes
- Upgoing plantars
- Decreased pin-prick hands

- Diagnosis -
Case 2

- **Cervical myelopathy**
  - (in this age group) usually caused by degenerative change within the neck
    - Thickening of the ligamentum flavum
    - Spondylosis
    - Calcification of the disc

- **Surgical decompression**
  - Surgery is to stabilise to prevent worsening
  - Remember to check the neck for scars
    - Anterior and posterior approaches
Case 3

- 36 year old woman
- 12/12 history of tripping and legs giving way
- Pain and spasms in her legs
- Urinary urgency with incontinence

- PMH nil
- DH paracetamol
Case 3

- SH having difficulty with her work as a cleaner
  - Non smoker
  - 14 units ETOH per week
- FH nil
- On examination
  - Increased tone both lower limbs
  - Weak 4/5
  - Brisk reflexes
  - Upgoing plantars
- Diagnosis?
Case 3

- Spastic paraparesis
- Where is the lesion
- What is the cause
Case 3 - differential diagnoses

• Brain
  • Single lesion - parasagittal meningioma
  • Multiple areas involved - MS

• Spinal cord
  • Structural
    • Extrinsic compression
    • Intra-axial
    • Vascular
    • Infective
    • Traumatic
    • genetic
Case 3 - differential diagnoses

- Spinal cord
  - Structural
    - Extrinsic compression
      - Degenerative (disc) (check for scar)
      - Spinal metastasis (NB radicular pain)
    - Intra-axial
      - Cord tumour
    - Vascular
      - Infarct (anterior spinal artery)
    - Infective
      - HIV (vacuolar myelopathy)
      - HTLV
  - Traumatic
  - Genetic (hereditary spastic paraparesis)
Case 3 Investigations

- Imaging
  - MRI
  - Where
    - If there is a sensory level image above as well as below
Case 3 Diagnosis

- Imaging
  - Brain - multiple white matter lesions on T2 MRI. Periventricular/ corpus callosum
  - C spine cord signal change at C6
  - T spine - cord signal change at T10
  - Consistent in light of history with primary progressive MS
Diagnosis

- Multiple sclerosis
Case 3 Diagnosis

- Multiple sclerosis
  - RRMS, Primary progressive, Secondary progressive
  - Check history for episodes which could be consistent with previous relapses - i.e. optic neuritis, vertigo, sensory relapse
  - Relapse - treat with steroids depending on severity - either 1g intravenous methylprednisolone for 3/7 or oral methylprednisolone 500mg for 5/7 (not low dose prednisolone).
Case 3

- Disease Modifying Drugs
  - B-interferon
  - Glatiramer acetate (polymer of 4 a.a’s found in myelin basic protein)
  - Fingolimod (sphingosine-1-phosphate receptor modulator - sequesters lymphocytes in lymph nodes)
  - Natalizumab (monoclonal antibody against alpha 4 integrin 9 cell adhesion molecule)
Case 3

- Symptomatic treatment
  - Spasms and spasticity - muscle relaxants e.g baclofen
  - Detrusor instability - e.g oxybutynin
  - Pain - neuropathic pain agents such as amitryptilline
  - Fatigue - modafinil
  - Mood - antidepressants

- MDT
Prognosis

- **Progressive MS**
  - No disease modifying drugs
  - 8 years to reach EDSS 6 (needs walking aid)
  - Fampridine - improved walking times

- **RRMS**
  - 90% walking at 10 years
  - 75% walking at 15 years
  - 15 years to reach EDSS 6
  - Prognosis worse if older, male, presenting with cerebellar and motor relapses
MS Diagnosis

- 2 relapses separated in time and space

- McDonald criteria
  - Number of lesions supra and infratentorially
  - Gadolinium enhancement
  - CSF supportive - oligoclonal bands
Case 4

- 67 year old male hat maker
- Presents with a 4 month history of right foot drop
- 1/12 right hand weakness

PMH
- Angina

DH
- Aspirin, Diltiazem
Case 4

- SH
  - Smokes 20 per day, ETOH 3 pints per day

- On examination
  - CNS NAD
  - Upper limbs
    - Tone normal
    - Wasting first dorsal interosseii right hand
    - Brisk left triceps and biceps jerk
    - Finger flexion 4/5, abduction 4/5 right hand
Case 4 examination

- Lower limbs
  - Tone slightly increased in right leg
  - Hip flexion 4/5 right
  - Dorsiflexion 4/5 right
  - Brisk knee jerk right
  - Plantars equivocal
  - Fasciculations both thighs and calves

- Diagnosis ??
• Motor only
• Signs in 3 limbs
• UMN and LMN signs
• Lesion - anterior horn cell
• MND (ALS)
Case 4

- Motor neuron disease
  - Progressive neurodegenerative disorder of anterior horn cell
  - ALS - commonest type
  - Progressive bulbar palsy - presents with dysarthria and dysphagia, poorer prognosis
  - Primary lateral sclerosis - UMN
  - Primary muscular atrophy - LMN
Case 4

- **Diagnosis**
  - Acute and chronic denervation in different regions (cervical, thoracic, lumbar and bulbar)
  - El Escorial criteria
  - Imaging to r/o cervical radiculomyelopathy

- **Treatment**
  - Riluzole blocks sodium channels indirectly inhibiting stimulation of glutamate receptors (NB 2/52 LFT’s)
  - MDT
  - NIV - ALS do better than PBP
Case 5

- 57 year old man
- 1 year history of difficulty walking - unsteady
- Crawling up stairs on hands and knees
- Numb feet
Case 5

- PMH
  - Gastric ulcer

- DH
  - omeprazole

- SH
  - ETOH XS > 100 units per week
  - Smoked 30 per day
Case 5

- CNS normal (no nystagmus)

- Upper limbs
  - Pinprick reduced to wrist
  - Soft touch reduced to wrist
  - Vibration sense normal
  - Reflexes present

- Lower limbs
  - Pinprick reduced to knee
  - ST reduced to knee
  - VS reduced to ASIS
  - Ankle jerks absent
Case 5

- Tone normal
- No cerebellar signs
- Plantars downgoing
- Romberg’s positive
- Gait unsteady but fairly narrow based
- Difficulty tandem walking
- Diagnosis???
Case 5

- LMN and sensory
- Symmetrical (glove and stocking)
- Lesion - peripheral nerve
- Diagnosis - peripheral neuropathy
- Cause (s)?
Case 5 Peripheral neuropathy

- Congenital
- Acquired
  - Infective
  - Neoplastic
  - Vascular
  - Inflammatory
  - Trauma
  - Endocrine
  - Degenerative
  - Metabolic
  - Drug
  - Idiopathic
  - Iatrogenic
  - Immunological
Case 5 Causes

- Acquired
  - Infective - leprosy
  - Neoplastic - MGUS/myeloma/paraneoplastic
  - Vascular - small vessel vasculitis (rare more usually mononeuritis multiplex)
  - Inflammatory - AIDP/CIDP
  - Trauma - no
  - Endocrine - DM, hypothyroidism
  - Degenerative
  - Metabolic - B12
  - Drug/toxin - thalidomide, chemotherapy, ETOH, lead
  - Idiopathic - 1/3rd cause unknown
  - Iatrogenic
  - Immunological
Case 5

• Treatment

treat underlying cause

neuropathic pain agents

immune modulation for inflammatory demyelinating neuropathy
Case 6

- 26 year old woman
- 1/12 history of drooping left eyelid and double vision
- 1/52 food sticking with occasional choking and difficulty climbing stairs

PMH
- vitiligo
Case 6

- DH
  - Propranolol recently started for anxiety

- SH
  - Non-smoker
  - No ETOH
  - Single
Case 6

- On examination
  - Left ptosis
  - Diplopia on left and right gaze
  - Left eye doesn’t fully elevate
  - Mild facial weakness
  - Weakness of neck extension
  - Proximal muscle weakness 4+/5
  - Remainder examination normal

- Diagnosis????
Case 6 Diagnosis

- Asymmetric
- Cranial nerve and proximal muscle involvement
- Fatiguable muscles
- Lesion - NMJ
- Diagnosis Myasthenia gravis
Case 6 Myasthenia gravis

- Autoimmune
- Female > male
- Two peaks of incidence (3\textsuperscript{rd} decade (F) and 60 +(m)
- Antibodies against nicotinic ACh receptors
1 - Pre-synaptic Terminal
2 - Sarcolemma
3 - Synaptic vesicles
4 - Acetyl Choline Receptors
5 - Mitochondria
Normal NMJ

- Action potential
- Ach released from 150-200 vesicles
- Binds to post-synaptic Ach receptors
- Receptor opens and sodium enters the cell causing depolarisation at the muscle endplate
- Action potential if depolarisation is large enough

- Terminated by hydrolysis of Ach by AChesterase and diffusion of Ach away from the receptors. Normally the amount of Ach released per impulse decreases with repeated stimulation
MG

- Reduced number of receptors (symptomatic from about 30% of normal).
- Ach released normally but end plate potential smaller which may fail to trigger muscle action potential
- Decreased efficiency of neuromuscular transmission combined with normal presynaptic rundown - increased weakness - fatiguability
Diagnosis

- Antibodies
  - AChR
  - MUSK
- Tensilon test
- SFEMG
Treatment

- Symptomatic
  - Pyridostigmine (SE diarrhoea and abdominal pain)

- Immune modulating
  - Prednisilone
  - IVIg
  - Azathioprine

- Thymectomy
  - All patients with thymectomy
  - Patients upto 55 without thymoma but with generalised MG
  - Improvement delayed for months to years
Treatment MG

- Remission induced by thymectomy occurs more frequently in young patients with a shorter duration of disease, hyperplastic thymus, high antibody titre
- Remission rates increase with time
Case 7

- 72 year old woman
- 2/12 history of progressive muscle weakness
- Can’t lift her arms to brush her hair
- Difficulty rising from a chair or climbing stairs
Case 7

- PMH
- DH
- SH
Case 7

- On examination
  - No facial weakness
  - Proximal weakness upper and lower limbs
  - Eczematous skin rash on torso
  - Thickening of skin over knuckles

- Diagnosis ????
Case 7 Diagnosis

- Proximal weakness
- Lesion - muscle
- Myositis
Case 7 Proximal myopathy

- Congenital
- Acquired
  - Infective
  - Neoplastic
  - Vascular
  - Inflammatory
  - Trauma
  - Endocrine
  - Degenerative
  - Metabolic
  - Drug
  - Idiopathic
  - Iatrogenic
  - Immunological
Case 7 Proximal Myopathy

- Congenital - muscular dystrophies, mitochondrial
- Acquired
  - Infective-HIV, Coxsackie B, Influenza, parasitical
  - Neoplastic - paraneoplastic
  - Vascular - PMR
  - Inflammatory - polymyositis, dermatomyositis
  - Trauma - no
- Endocrine - acromegaly, diabetes, hyperparathyroidism
- Degenerative
- Metabolic - hypokalaemia, Vitamin D
- Drug/toxins - steroids, ETOH, statins, colchicine, chloroquine
- Idiopathic
- Iatrogenic
- Immunological
Case 7 Investigation

- Bloods including CK
- EMG
- Muscle biopsy

- Treatment depends on cause
Spinothalamic tract
Sensory - spinal cord

- Ipsilateral loss of tactile discrimination and vibration sense from leg
- Ipsilateral loss of tactile discrimination and vibration sense from arm
- Ipsilateral spastic paraparesis
- Ipsilateral flaccid paralysis in affected myotomes
- Contralateral loss of pain and temperature sensation one segment below lesion
- Bilateral loss of pain and temperature within affected dermatomes

Tracts:
- Gracile fasciculus
- Cuneate fasciculus
- Corticospinal tract
- Spinocerebellar tract
- Spinthalamic tract
- Ventral white commissure
Case 8

- 38 year old man had noticed a 3 month history of stiffness and weakness of his left leg, catching his toe on the ground.

- Also had difficulty sensing the cold tiles and bath temperature with his right foot
Case 8 on examination

- Ipsilateral weakness
- +/- ipsilateral JPS and vibration loss
- Contralateral light touch and temperature loss
- At level of insult a discreet area of sensory loss and motor weakness may occur (damage to efferent and afferent fibres at that level)
Left hemi-cord lesion gives:
- L weakness
- L dorsal column signs
- R spinothalamic signs
Case 10

- 52 year old man
- 2 year history of unsteadiness and falls

PMH
  nil

DH
  none

SH
  ETOH 12 units per week, non smoker
Case 10

- On examination
  - Nystagmus on lateral gaze
  - Dysdiadochokinesis
  - Mild intention tremor
  - Broad based gait

- Diagnosis ??
Cerebellar syndrome

- Congenital - Friedrich’s ataxia, SCA
- Acquired
  - Infective - influenza
  - Neoplastic - primary or metastasis (also paraneoplastic)
  - Vascular - stroke
  - Inflammatory - MS
  - Trauma - no
  - Endocrine - hypothyroidism (rare)
  - Degenerative - MSA type C
  - Metabolic - wilson’s (rare)
  - Drug/toxin - ETOH, lithium, anticonvulsants
  - Idiopathic
  - Iatrogenic
  - Immunological- coeliac disease
Case 11

- 65 year old man
  - 18/12 history tremor of right hand
  - Walking slower and shuffley

- PMH
  - Diabetes

- DH
  - Metformin
Case 11

- **SH**
  - Smoker
  - No ETOH

- **O/E**
  - Hypomimia
  - Cogwheel rigidity right
  - Intermittent rest tremor
  - Bradykinesia
  - Shuffling gait with reduced armswing
Case 11

- Parkinsonism
  - Idiopathic PD
  - Drug induced parkinsonism
  - Parkinson’s plus
  - Vascular parkinsonism
  - Metabolic (Wilson’s)
  - Rare genetic forms PD
Dopaminergic medication
- Levodopa (dyskinesia and motor fluctuations)
- Dopamine agonists (impulse control disorders)
- COMT inhibitors
- MAOIB inhibitors
Case 12

- 17 year old with blackouts over 6 months
  - Diagnosis ??
History

- precise history
- before, during, after the ictus
- ‘last thing you remember’
- ‘next thing you remember’
- warning symptoms/aura
- witness account-pale/blue, sweaty, movements, vocalisations, breathing etc
- recovery
- incontinence, tongue biting
History

- Predisposing factors - sleep, meals, alcohol, drugs
- previous episodes
- cardiac symptoms - SOB, palp, chest pain
- FH
- DH
- other PMH
- birth, development
- job, driving, family
Examination

- cardiac, postural BP
- generalised epilepsy - usually normal
- focal onset...look for focal abnormality
Epilepsy/Blackouts

- Is it epilepsy?
- If not what is it?
- If epilepsy....
- what type
- underlying cause
- what tests
- what treatment
- what advice?
‘Petit Mal’ and ‘Grand Mal’ are terms for non neurologists!
Lifestyle

- Inform DVLA in writing
- licence back after 1yr fit free
- or after 3 years if fits only in sleep
- swimming, ladders, machinery, job
- alcohol, drugs-recreational, OTC, OCP
- compliance, SEs,
- pregnancy
- management of a fit/when to call ambulance
Case 13

- 35 year old woman
  - Left hand numb 3 months
  - Intermittent
  - Worse at night

- PMH
  - Hypothyroid

- DH
  - Thyroxine 75mcg
Case 13

- O/E
  - Decreased pin-prick and soft touch over hand
  - Tinel’s and Phalen’s positive

- Otherwise normal

- Diagnosis??
Case 13

- Carpal tunnel syndrome
- Single nerve involvement - entrapment neuropathy
- Pregnancy
- Rheumatoid arthritis
- Acromegaly
- Myxoedema
Case 13

- Treatment
  - Nocturnal splints
  - Steroid injection
  - Decompression (remember to check wrist for scar)

- Other entrapment neuropathy
  - Ulnar neuropathy
  - Common peroneal neuropathy
Case 14

- If multiple single neuropathy remember mononeuritis multiplex
  - Vasculitic
  - Diabetes
  - Multiple nerve compressions

- Check for evidence of vasculitis - emergency
• Remember
  • Where is the lesion
  • What could be the underlying pathology
• Possible neurology cases
  • Think stable chronic disease
  • Could include (no promises!)
    • MS
    • CVE
    • Myotonic dystrophy
    • PD
    • Peripheral neuropathy
Any questions?