NEUROLOGY APPROACH FOR MRCP

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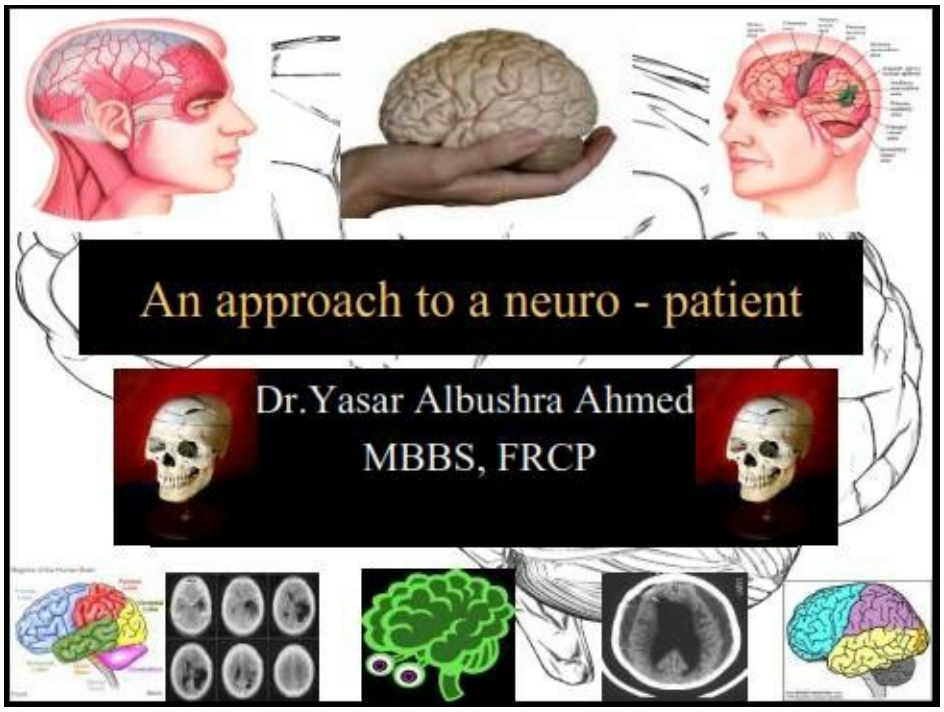


Symptoms of Neurological diseases

- Headache
- Weakness
- Sensory disturbance
- Convulsions / Fits / LOC
- Confusion
- Pain

Symptoms of Neurological diseases

- Symptoms referred to special senses :
  - * speech
  - * swallowing
  - * vision
  - * hearing
  - * smell
- Sphincter dysfunction

Symptoms of Neurological diseases

- Memory problems
- Abnormal movements
- Walking problems :Unsteadiness / Ataxia
- Impotence
- Sleep disorders
- Weight loss
- Abnormal behavior

Common neurological Diseases

- Infections :
  - + meningitis
  - + encephalitis
  - + meningo-encephalitis
- Inflammatory :
  - + Multiple sclerosis
- Neoplastic : + benign or malignant
  - + primary or secondary

Common neurological Diseases

- Degenerative :
  - + parkinson disease
  - + motor neurone disease
  - + dementia
- Epilepsy
- Congenital diseases
- Inherited brain diseases

Commonly used Terminology

- Brain : - Encephalitis - Encephalopathy
- Meninges : Meningitis
- Brain and meninges : meningoencephalitis
- Spinal cord : myelitis --- myelopathy
- Roots or radicles:Radiculitis- Radiculopathy
- Spinal cord + radicles : myeloradiculopathy
- Nerves : Neuritis --- Neuropathy
- Muscles : myositis ---- myopathy
- Muscles and Skin : Dermatomyositis

Commonly used terminology

Coma	Decreased level of consciousness
Drowsiness	Impaired level of consciousness
Disorientation	Lack of orientation to time and place
Amnesia	Loss of memory
Apraxia	Inability to follow orders
Agnosia	Inability to recognize objects

The neuro-pyramid

History – in Neurology

- Age
- Gender
- Ethnic group
- Occupation
- Family history
- History of travel
- History of vaccination

History - in Neurology

- Onset of symptoms
- Duration of symptoms
- Associated symptoms
- Other medical problems
- Medications
- Social habits : smoking / alcohol. . . .

Neurological Examination

An easy approach

Goals of Neurological Examination

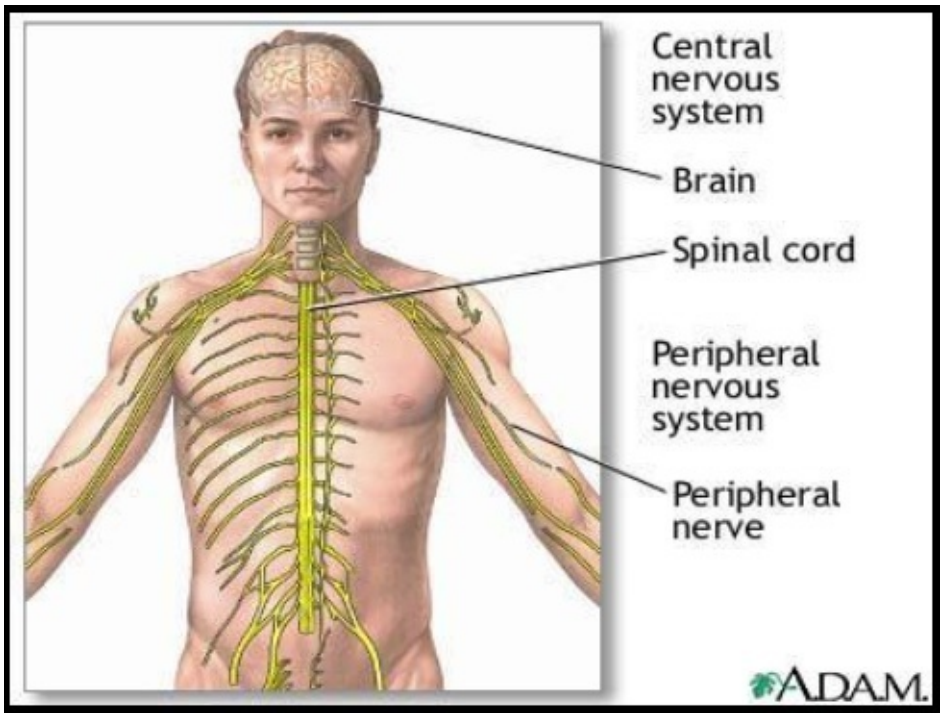
- To determine whether in fact a neurological dysfunction exists
- To localize the lesion : CNS or PNS
- To identify which component of the nervous system is affected (motor , sensory, cranial nerves ……)
- To put a differential diagnosis
- To plan investigations and/or treatment

Goals of Neurological Examination

- If somebody collapsed suddenly :
  is it a heart attack or Intracranial bleeding ?
- Somebody with nausea and vomiting:
  to refer to a gastroenterology or neurology ?
- Somebody with leg weakness :
  from degenerative disease , spinal cord compression or cortical lesion ?

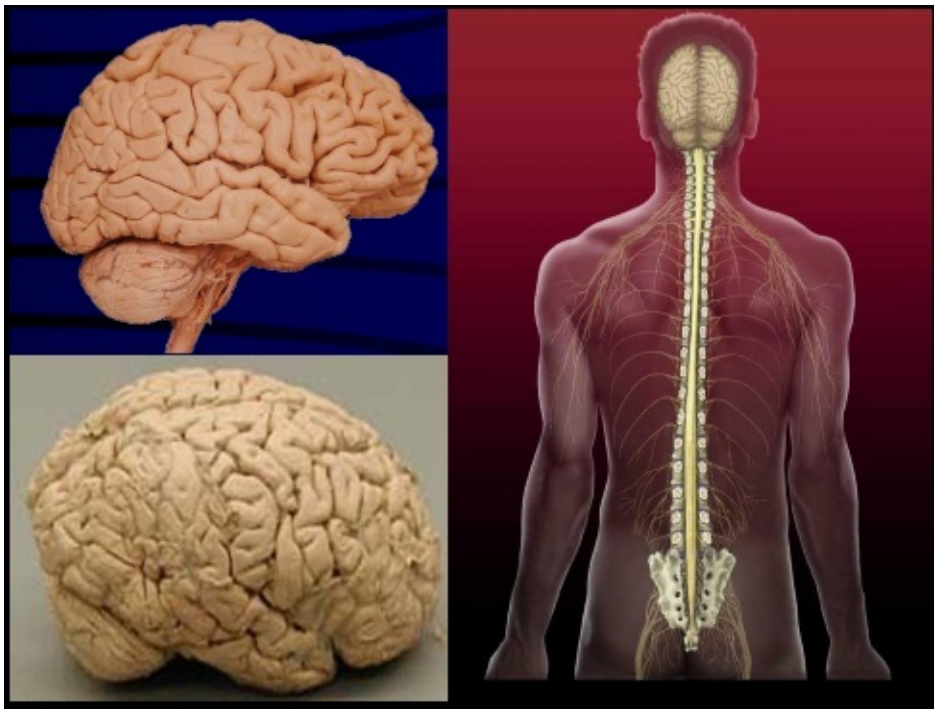
Neuro - Tray

- Ophthalmoscope
- Snellen chart
- Reflex hammer
- Neuro – tips
- Tuning fork
- Orange stick
- Tongue depressor



Where is the lesion ?

- Intracranial
- Extracranial



Where is the lesion ?

1 - The Brain

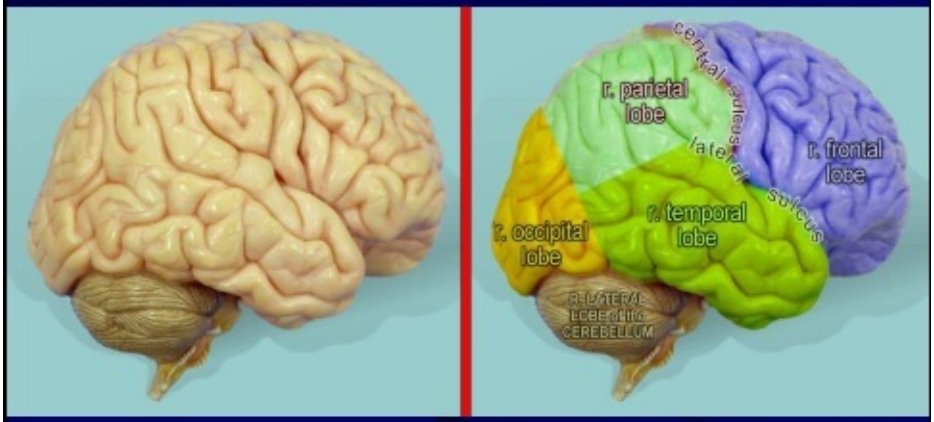
2 - The Spinal Cord

3 - The Peripheral Ns

4 - The Neuromuscular junction

Brain lesions : WHERE ???

- Cerebral (cortical) :
  - Frontal , parietal , temporal or occipital
  - Basal Ganglia
  - Brain stem
  - Cranial nerves
- Cerebellar



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Where is the lesion ? ?

UMNL	LMNL
- Increased Tone	- Decreased Tone
- Increased Reflexes	- Decreased Reflexes
- Extensor Plantars	- Flexor Plantars
- No Wasting	- Muscle Wasting
- No Fasciculation	- Fasciculation

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Neurological Examination

- General inspection
- Behavior
- Gait
- Speech
- Intellect
- Abnormal movement

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Neurological Examination

- Neurocutanous conditions
- Signs of systemic diseases

Neuro-cutaneous conditions

Neurological examination (steps)

- Mental state
- Cranial nerves
- Motor examination
- Cerebellum and Gait
- Sensory
- Special tests

Mental State

- Level of Alertness , Attention and Cooperation
- Orientation
- Memory

Glasgow Coma Scale (GCS)

Eye opening (E)	Verbal response (V)	Motor response (M)
4=Spontaneous 3=To voice 2=To pain 1=None	5=Normal conversation 4=Disoriented conversation 3=Words, but not coherent 2=No words.....only sounds 1=None	6=Normal 5=Localizes to pain 4=Withdraws to pain 3=Decorticate posture 2=Decerebrate 1=None

Neurological Examination : motor system

1 - Inspection

- muscles : * Wasting
  * Fasciculation
  * muscle hypertrophy
- abnormal movement : tremor , twitching , jerky movement
- Posture and position
- Scars

Neurocutaneous conditions

Muscle wasting


Muscle wasting
98

Muscle wasting

Pes cavus

- Poliomyelitis
- CMT disease
- Friedrich Ataxia
- Long standing neuropathy

What is the diagnosis ?

- Charcotte- Marie-Tooth (CMT) disease

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Neurological Examination

- Tone
- Power
- Reflexes
- Sensation
- Special senses
- Cerebellar signs
- Gait

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Neurological examination

- Tone :
  - * normal tone
  - * Hypertonia
  - * Hypotonia

Neurological examination

- Tone :
  - Spasticity
  - Rigidity
  - Flaccidity

Neurological Examination : Power

- Paresis
- Plegia

- Mono- : 1 limb
- Hemi- : one side
- Para- : legs
- Quadri (tetra) : all 4 limbs
- Tri- : 3 limbs
- Di- : bilateral facial weakness

Neurological examination: Power

Grade	Power
0	No muscle contraction
1	Flicker of contraction
2	Active movement with gravity eliminated
3	Movement against gravity but not resistance
4	Movement against gravity & some resistance
5	Movement against gravity & full resistance

Neurological examination : Reflexes

- Reflexes :
  - primitive
  - Brain stem
  - Superficial
  - Deep tendon reflexes

Primitive Reflexes

- Glabellar tap
- Sucking reflex
- Palmo-mental reflex

Brain stem Reflexes

- Corneal reflex
- Pupillary reflex
- Gag reflex
- ? Jaw jerk

Superficial Reflexes

- Abdominal reflex
- Cremasteric reflex
- plantar reflex

Plantar Reflex (Babiniski sign)

- Normal response :

1 - Down going of the big toe
2 - Fanning of other toes
3 - Inversion of the foot
4 - Dorsiflexion of the ankle
5- Withdrawal of the foot

Bilateral Up-going Plantars

- Physiological :

- Infancy
- Deep sleep

- Pathological :

- Bilateral UMNL
- Coma
- After epileptic seizure

Deep Tendon Reflexes

Upper Limbs :

- Biceps : C5 C6

- Triceps : C6 C7

- Brachioradialis : C5 C6

Deep Tendon Reflexes

Lower limbs :

- Knee reflex : L3 L4

- Ankle reflex : L5 S1

Deep tendon Reflexes

- Absent
- Obtainable after re- enforcement
- Diminished (low normal)
- Normal
- Increased
- Brisk
- Clonus (very brisk)

Neurological examination

7 - Special sense :

* position sense
* Vibration sense
* Hearing
* Swallowing

Neurological examination of the Eyes

- Neurological conditions that affect the eye :
- Bell's palsy
- Horner's syndrome
- Dystrophia myotonica
- Myasthenia Gravis
- Progressive Supranuclear Palsy (PSP) and Parkinson's
- Cavernous sinus thrombosis
- BIH
- Multiple sclerosis
- Foster – Kennedy syndrome

Neurological examination of the Eyes

9 - Eye examination :

* Inspection
* Acuity
* Visual Fields
* Eye movement
* Pupils
* Fundus examination

Eye examination : inspection

- Symmetry
- Appearance
- Exophthalmos
- Enophthalmos
- Ptosis
- Signs of hyperlipidaemia
- Colour

Eye examination : Exophthalmos

- Bilateral :
- > common
- Thyrotoxicosis is the commonest cause

- Unilateral :

- Tumour
- Cavernous sinus thrombosis
- Abscess or cyst

Eye examination: Ptosis

- Unilateral :
- Third nerve palsy
- Horner's syndrome

- Bilateral :
- Congenital
- Dystrophia myotonica
- Myasthenia gravis

Ptosis

- Unilateral or bilateral
- Complete or partial
- Long standing or recent

Hyperlipidaemia

- Xanthelasma
- Xanthoma




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Colour of the eyes

Jaundice


Blue sclera

- Osteogenesis imperfecta
- Marfan's syndrome

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What is this abnormality ?

- Corneal Arcus :
  (Arcus cornealis)

- Senility

- Hyperlipidaemia

What is the cause of this eye sign ?

Wilson Disease

(Kaysier- Fleisher ring)

Eye examination : the pupils

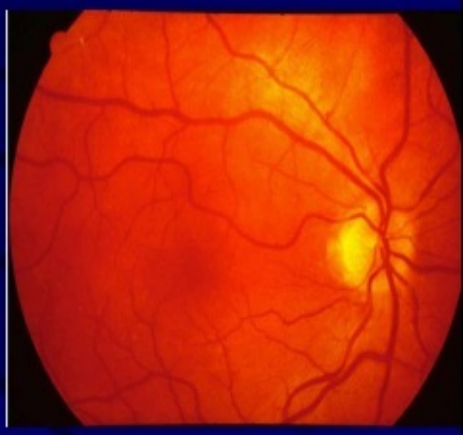
- A normal pupil : responds to light and accommodation
- Bilateral dilated pupils :
  - death
  - drugs
  - bilateral third nerve palsy (rare)
- Bilateral constricted pupils :
  - pontine haemorrhage
  - drugs : opiates

Eye examination : the pupils

- Argyle-Robinson pupil:
  - Reacts to Accommodation but not to light
  - Seen in syphilis and Diabetes
- Holmes – Addie pupil :
  - A unilaterally dilated pupil
  - > in females
  - associated with hyporeflexia
- Marcus – Gunn pupil :
  - seen in optic neuritis

Examination of the eye : the Fundus

- Get familiar to the ophthalmoscope
- Right eye – Right hand – Right eye
- Reasonable distance
- Explain to the patient
- See as many as normal fundi as possible



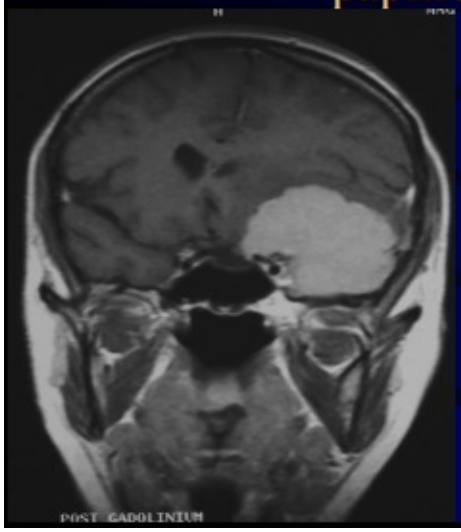
Fundus : what is the abnormality ?

- Optic Atrophy
- Optic nerve compression
- Chronic papilloedema
- Recurrent optic neuritis

Fundus: what is the abnormality ?

- Papilloedema :
- Increased ICP
- BIH
- Malignant hypertension
- Carbon monoxide poisoning

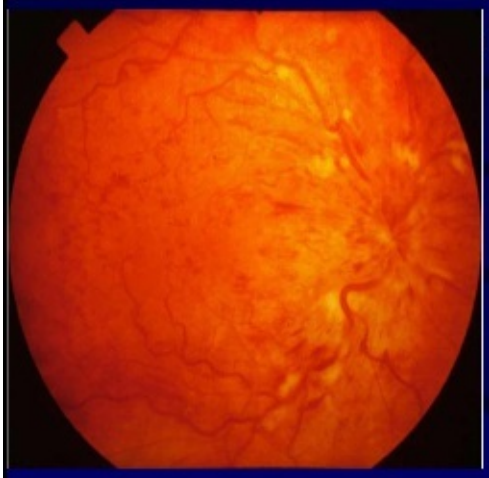
Left optic atrophy + Right papilloedema



Foster kennedy sydrome

Papilloedema

Fundus : what is the abnormality ?



- Central vein occlusion

This Patient was asked to look to the Left and then to the Right

- Left right fundus

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Patient known to have MS :examine the eyes

- Inter- nuclear ophthalmoplegia (INO)
- Nystagmus
- Optic atrophy
- Optic neuritis

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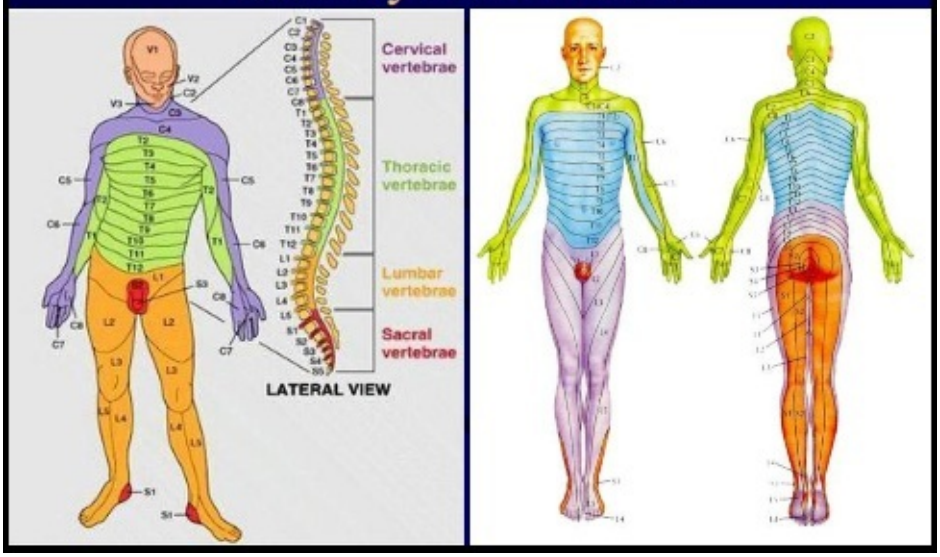
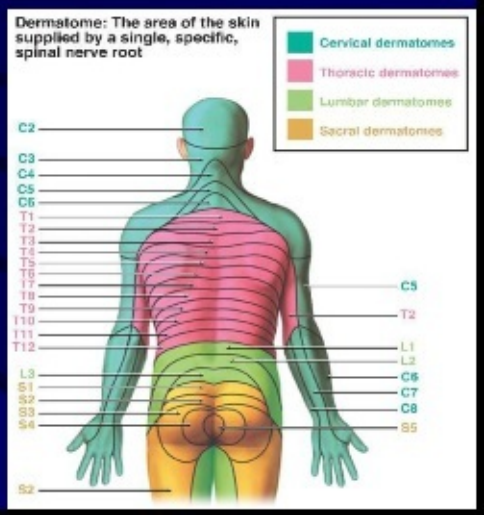
Sensory examination

- A dermatome : is an area supplied by a single peripheral nerve

Sensory examination



Sensory examinatin



Cerebellar signs

- The cerebellum is responsible for the coordination of the movement of :

1- The eyes : 1

2- The speech organs : 1

3- The hands : 4

4- The gait : 2

Cerebellar signs

1- Nystagmus
2- Scanning of speech
3- Intension tremor
4- Dysmetria
5- Dysdiadokinasia
6- Hypotonia
7- Ataxia
8- Pendular reflexes

Neurological examination : the Gait

- To walk normally , you need :

- the brain (motor cortex)
- the cerebellum (for co-ordination)
- the spinal cord (for position sense)
- the musculo-skeletal system (bones , joints and muscles)

Neurological conditions that affect the Gait

- Stroke
- Cerebellar diseases
- Parkinson disease
- Multiple sclerosis
- Spinal cord diseases eg SACD
- Muscle disease
- Foot drop
- Peripheral neuropathy

Types of Gait

* Hemiplegic gait
* Ataxic gait
* Spastic gait
* Shuffling gait
* High steppage gait
* Stamping gait
* Scissoring gait
* Waddling gait

Case 1

- A 52 year old lady presented with unsteadiness and balance problem progressing for the last 4 months……

How can the history , clinical examination and investigations help you to reach a diagnosis ???

Case 1 : history

- To confirm a neurological cause for her symptoms
- To help you in finding the Aetiology !!!!!

Case 1 : history

- Any symptoms of neurological diseases that affect the gait :

- cerebellar symptoms
- Parkinson disease
- peripheral neuropathy

Case 1 : history

- Cerebellar symptoms :
- Difficulty on focusing
- Slurring of speech
- Tremors
- Ataxia

- Parkinson disease :
- Rigidity
- Morning stiffness
- Difficulty in speech
- Tremors
- Poor mobility
- Difficulty on walking

Case 1 : history

- Patient has Ataxia
- Slurring of speech
- Tremor of both hands

Case 1 : history

- Past medical history :

- No history of hypertension or Diabetes
- Mild osteoartheritis
- No history of chronic liver disease

- On no medications apart from aspirin and multivitamines

Case 1 : history

- Other neurological symptoms :
  - no headache
  - no limb weakness
  - no convulsions
  - no sphincteric dysfunction
  - no sensoty symptoms

Case 1 : history

- Social history :
  - ex-smoker (stopped 2 years ago)
  - no alcohol
  - irregular periods

Case 1 : diagnosis from the history

cerebellar disease

Case 1 : examination

- A bit slow
- Normal systemic examinations
- Fine bilateral horizontal nystagmus
- Kinetic tremor , dysdiadokinasia and dysmetria
- Ataxic gait
- No pyramidal signs
- Position and vibration sense are intact

Case 1 : diagnosis

Pan-cerebellar disease

????????? cause

Case 1 : differential diagnosis

- Multiple sclerosis
- Cerebellar infarction
- Bleeding
- Tumour
- Drug – induced
- Chronic liver disease
- Hypothyroidism

Case 1 : investigations

- Normal :
  - FBC
  - U&Es
  - LFT
  - Random blood glucose
  - TFT
- ESR : 60

Case 1 : MRI

NORMAL

Case 1 : CXR

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Case 1 : diagnosis

Paraneoplastic syndrome

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Case 2

- A 62 year old man , presented with weakness of both legs ….and over few days he was unable to walk..

What questions you would ask in the history to help you to localize the lesion ?

Case 2

- Lesion may be :

* The brain
* The spinal cord
* The peripheral nerve
* Neuro-muscular junction
* Muscles

Case 2 : Differential Diagnosis

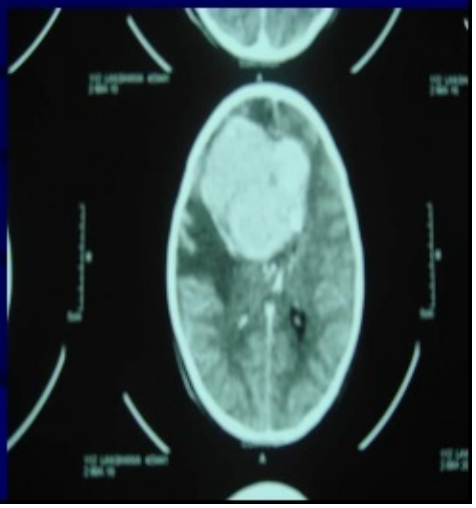
- Parasagital lesion
- Spinal cord lesion ;
  - compression
  - myelitis
  - ischemic
- GBS
- Muscle disease

Case 2

- Headache
- Convulsions
- Sensory symptoms
- Involvement of the upper limbs
- Sphincteric dysfunction (B&B)
- Muscle pain or tenderness

Parasagital meningioma

- No headache
- No convulsions



Case 2

- Reduced feeling on his legs
- Retained urine on the day of admission
- No pain or tenderness
- No history of infection

Case 2

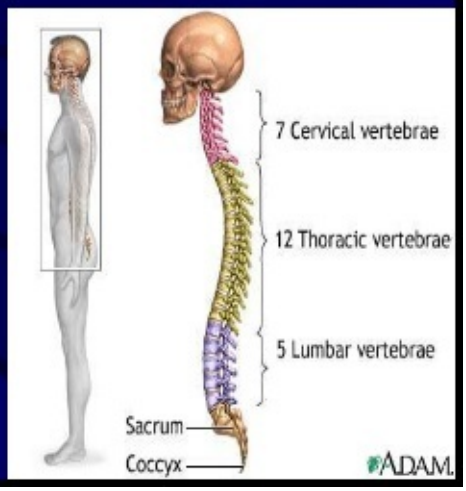
- Most likely spinal cord lesion ….

Where is the lesion ?????

What is the lesion ??????

Case 2 : Where ?

- Cervical cord
- Thoracic cord
- Lumbar



Case 2 : where ?

- Were the upper limbs involved ?

  NO
- Any sensory level ?

  Yes .. Around the umbilicus
- Any sphencteric problems ?

  Yes ..retained urine on admission day

Case 2 : What ??

- History of trauma ?

NO
- Back pain ?

Yes ,, mid and lower back ,of moderate severity
- History of fever or sweating ?

NO

Weight loss ?

NO

Other medical problems ? Hypertension

Case 2 : examination

- All cranial nerves were intact
- Upper limbs : normal
- Lower limbs : spastic paraparesis (3/5)
- Sensory level up to umbilicus
- No cerebellar signs
- Position and vibration sense : intact

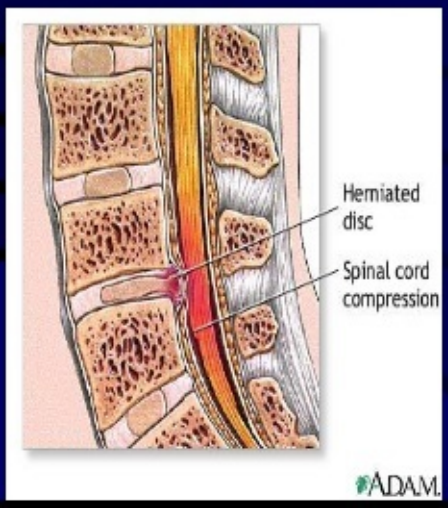
Case 2 : Which investigation ?

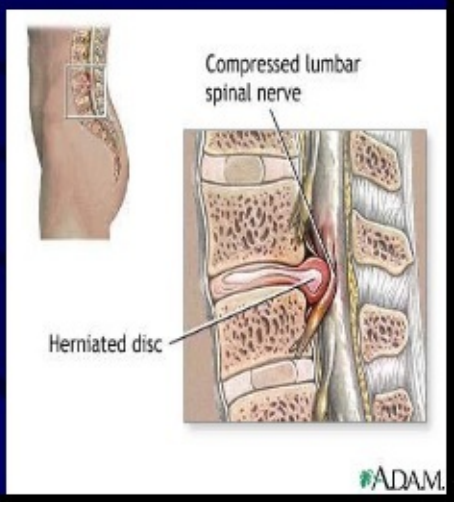
1- CXR
2- B12 and folate levels
3- CK
4- TFT
5- CT of the spines
6- MRI of the spines
7- Lumbar Puncture

Case 2 : MRI

Thoracic Disc prolapse
(T9 and T10)

Case 2





Case 3

- A 56 year old Saudi man
- PMH : not significant
- Non-smoker
- Returned home late that night after enjoying a party
- Felt sick during the night with mild neck pain
- woke up with severe dizziness , nausea and vomiting and unsteadiness

Case 3

- Mild left sided weakness
- No headache
- No convulsions
- Slurring of speech and some swallowing difficulties
- No sphincteric dysfunction

Case 3

- Where is the lesion from the history ?

Case 3 : examination

- Examined on bed as he was unable to sit up because of dizziness
- A mild left-sided partial ptosis was noted
- Fine bilateral horizontal nystagmus > right
- No papilloedema
- Impaired gag reflex – No facial weakness
- Soft cerebellar signs > on the right
- Mild pyramidal signs on the left

Case 3

- Where is the lesion after examination ?

1- Cerebral cortex
2- Brain stem
3- Basal ganglia
4- Cervical spinal cord
5- Cerbellum

Case 3

- Which investigations :

1- CXR
2- Serum cholesterol
3- ESR
4- CT brain
5- MRI brain
6- MRI- Cervical spines
7- Cerebral Angiography

Case 3 : causes

- What were the possible causes :

1- bleeding
2- vestibular neuritis
3- labrynthitis
4- stroke
5- malignancy
6- infections : brucella,TB, viral , bacterial

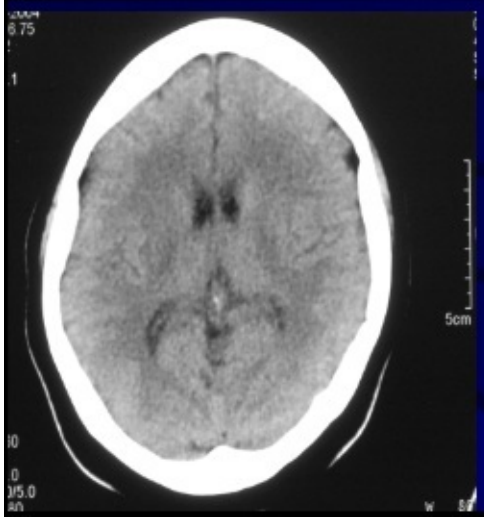
Investigations in Neurology

- Blood :
- FBC - ESR
- Biochemical profile : U&Es , LFT
- CRP
- TFT
- CK
- Autoimmune profile
- Plasma protein electrophoresis

Investigation in Neurology

- Neuro-radiology :
  - CT
  - MRI
  - Angiogram
  - CTA , MRA , MRV
  - CXR and USS

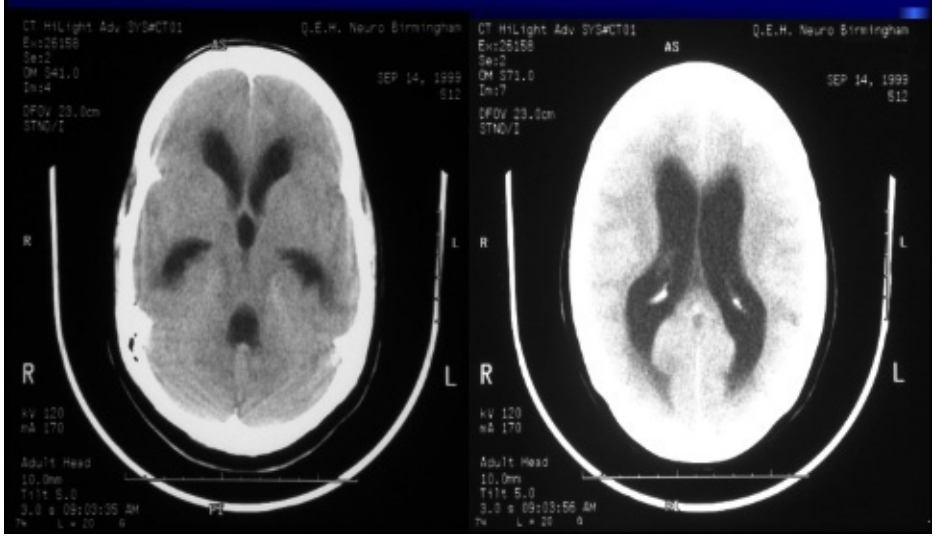
CT



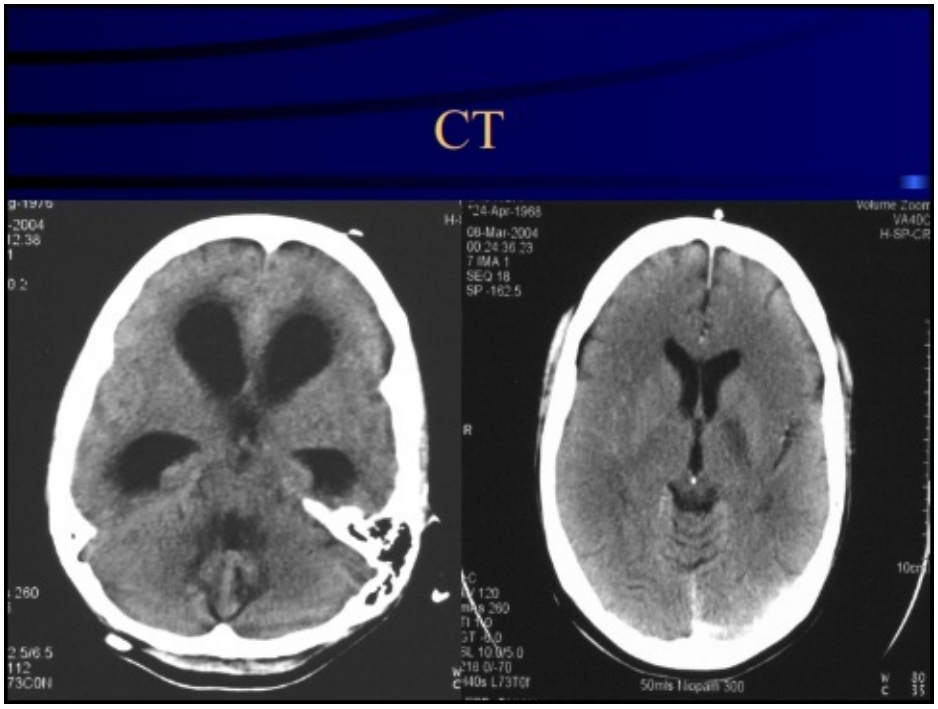
CT

- CT is good in :
- Emergency situations to R/O SOL
- Acute haemorrhage
- Infarction (after 8 to 10 hours)
- intracranial calcification
- Before LP if discs are not clear

CT



CT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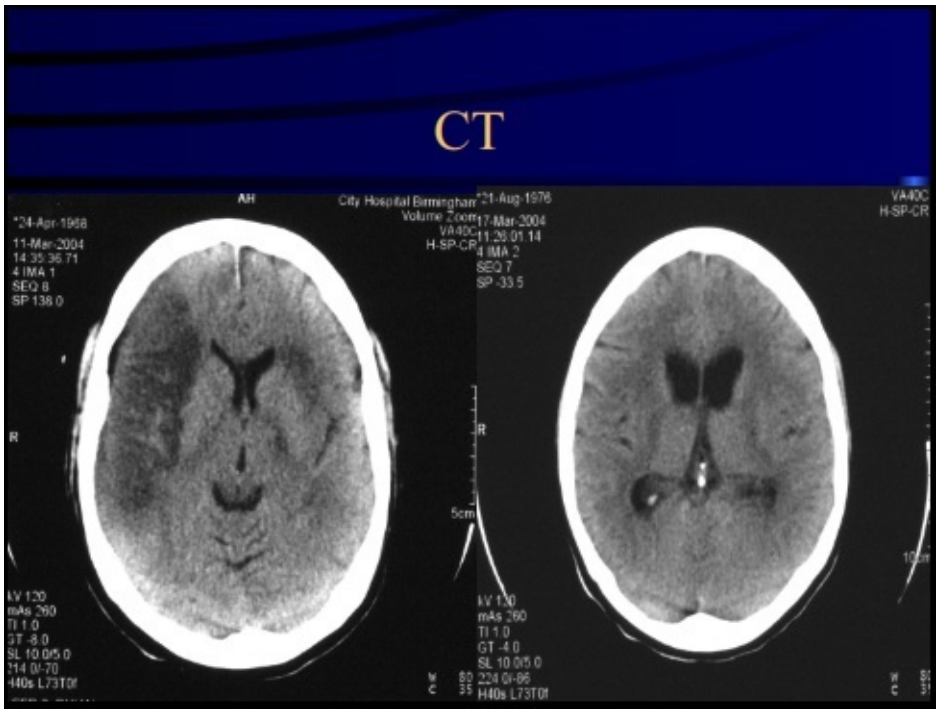
CT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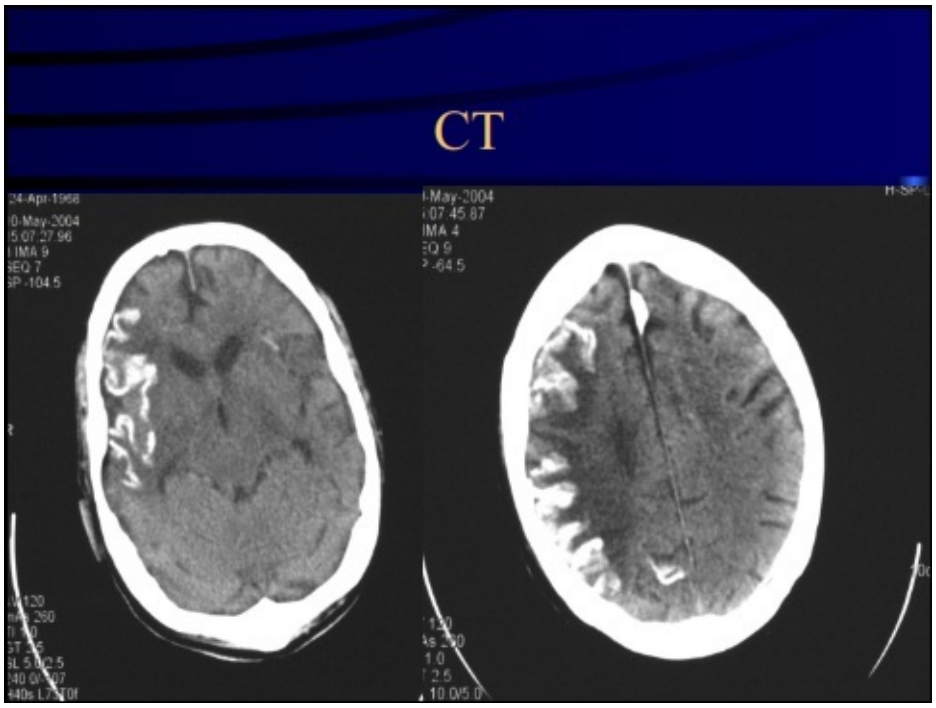
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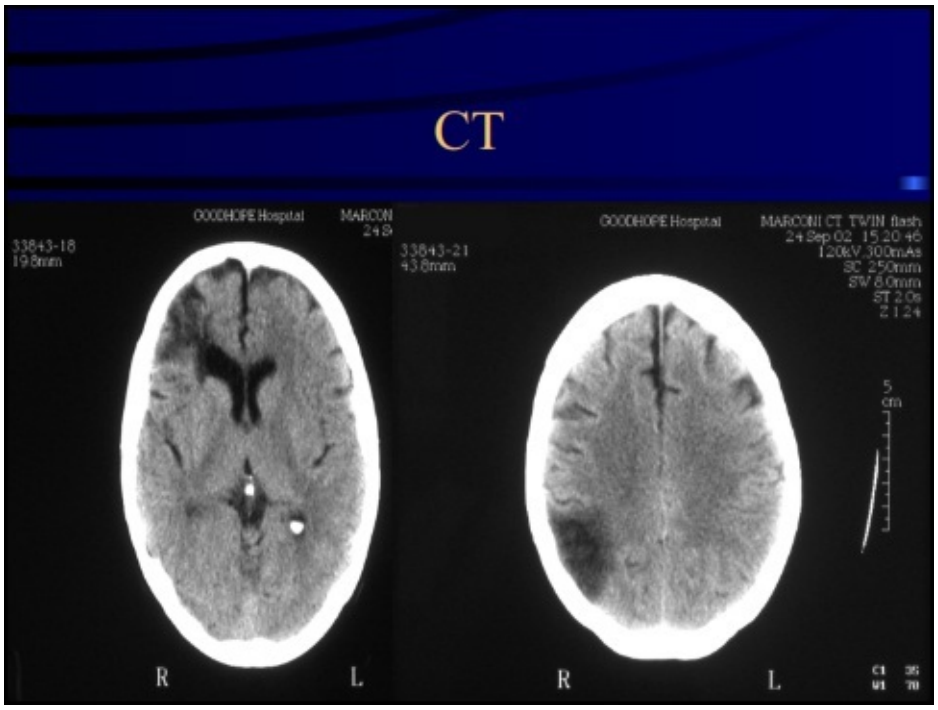
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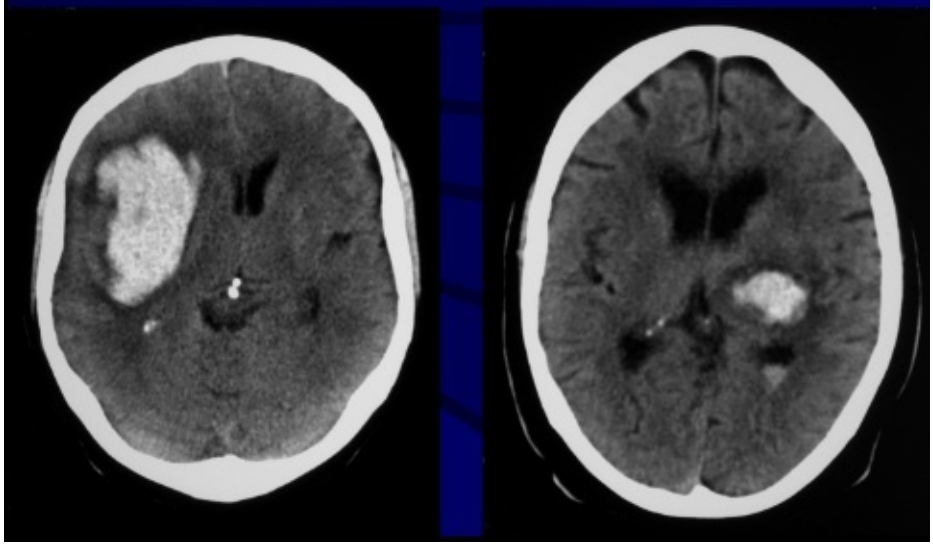
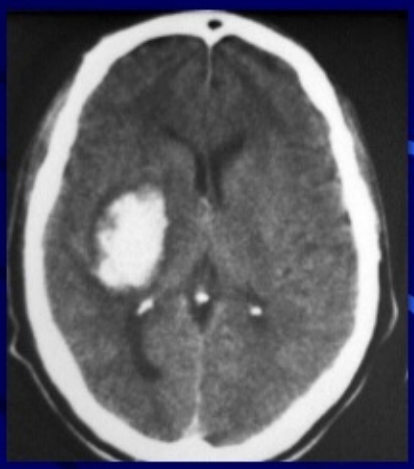


Intracranial calcification

- Physiological :

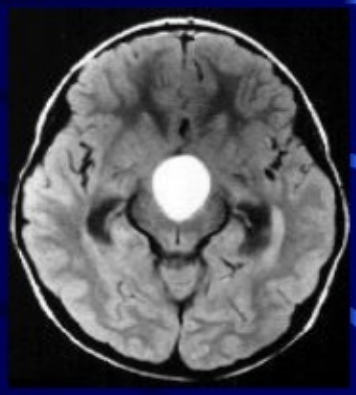
- Choroid plexus
- Pineal body
- Dura
- Basal ganglia

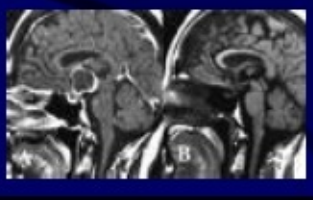


Intracranial calcifications : pathological

1- Tumours :

- Meningiomas
- Craniopharyngioma
- Oligodendroglioma
- Cerebellar haemangio-blastoma



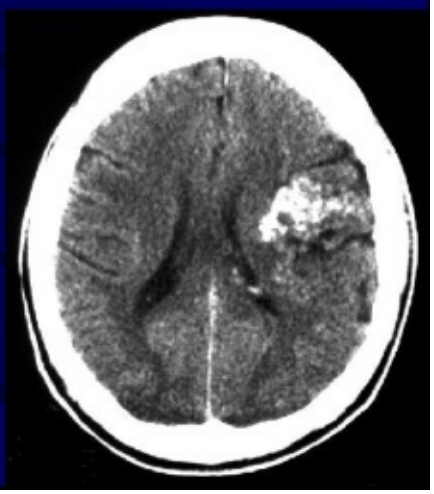


Pathological IC calcification

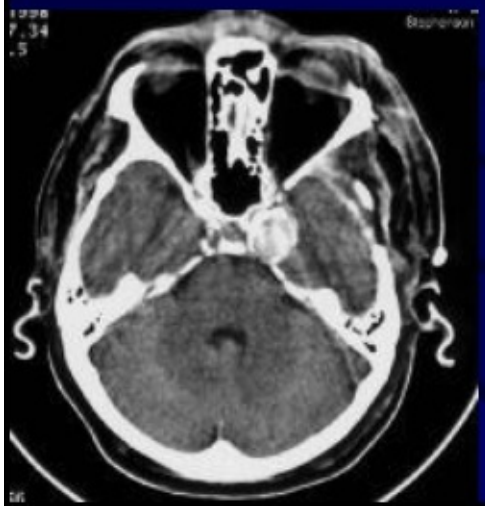
- 2- Vascular :

- Aneurysm
- Arteriovenous Malformation (AVM)
- Old haematoma

What is the clinical presentation !



What is the abnormality ?



- A giant calcified left carotid artery aneurysm

Pathological IC Calcification

3- Infections :

- Tuberculosis
- Toxoplasmosis
- Cysticercosis
- Hydatic cyst
- Old abscess

Pathological IC calcification

4- Metabolic :

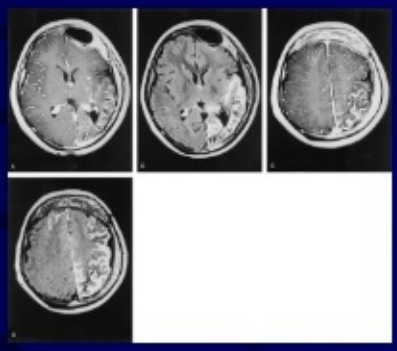
- Hypoparathyroidism
- Pseudo and pseudo-pseudo-hypoparathyroidism
- Wilson's disease

Pathological IC calcification

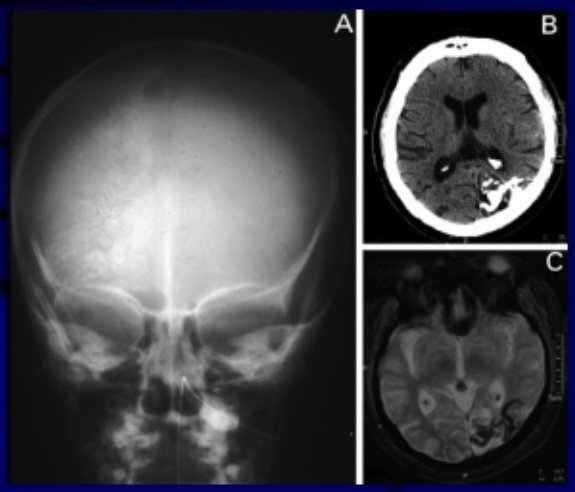
5- Miscellaneuos :

- Tuberous sclerosis
- Sturge – Weber's syndrome

Sturge weber's disease

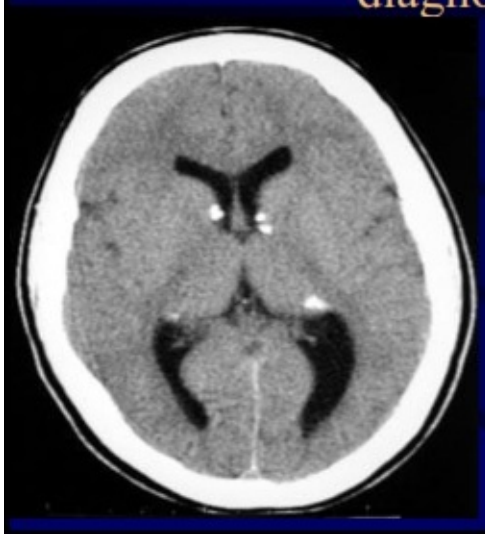


Sturge Weber's disease



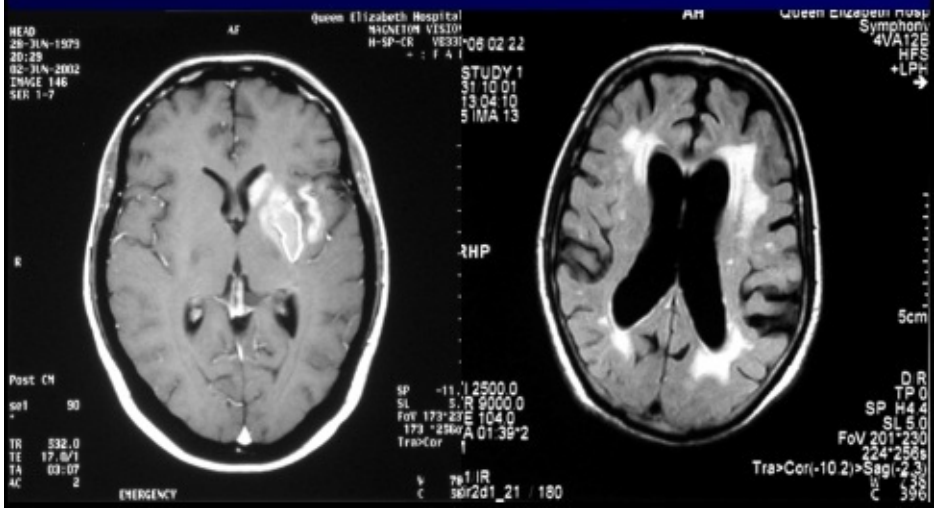
Tuberous sclerosis

What is the abnormality and the diagnosis ?

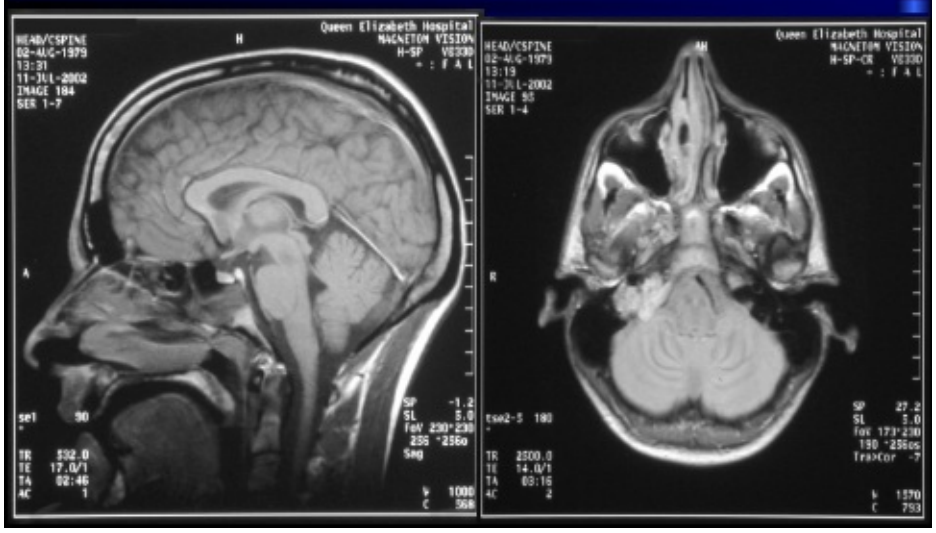


Tuberous sclerosis

MRI



MRI


Queen Elizabeth Hospital
HEAD/CSPINE
02-AUG-1979
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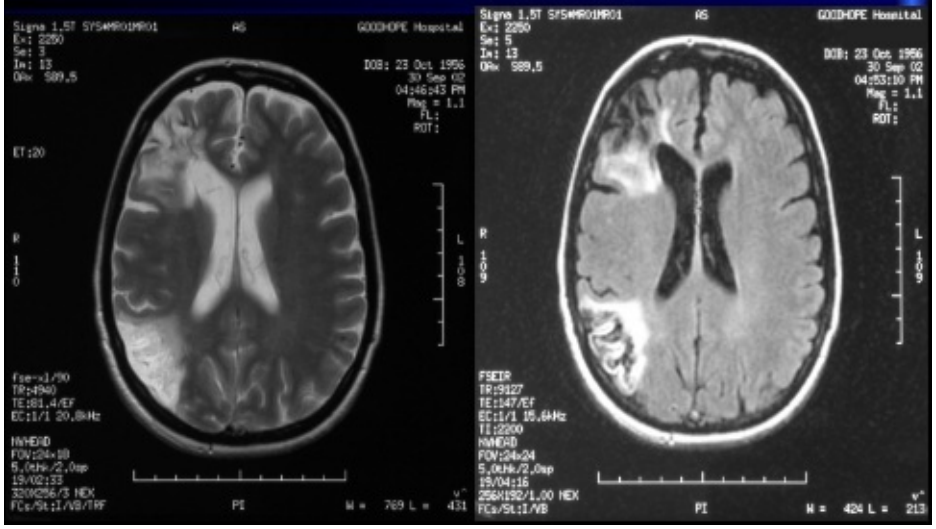
11-JUL-2002
IMAGE 184
SER 1-7
MAGNETOM VISION
H-SP VE30D
Queen Elizabeth Hospital
HEAD/CSPINE
02-AUG-1979
13:19
11-JUL-2002
IMAGE 85
SER 1-4
MAGNETOM VISION
H-SP-CR VE30D

MRI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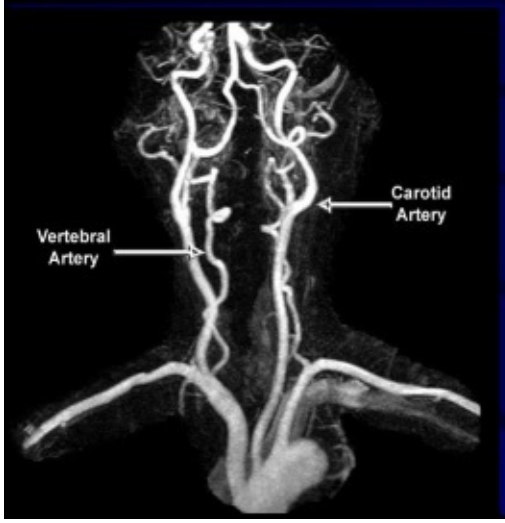
GOODHOPE Hospital
DOB: 23 Oct 1956
Signa 1.5T SYSWMR01MR01
GOODHOPE Hospital
DOB: 23 Oct 1956

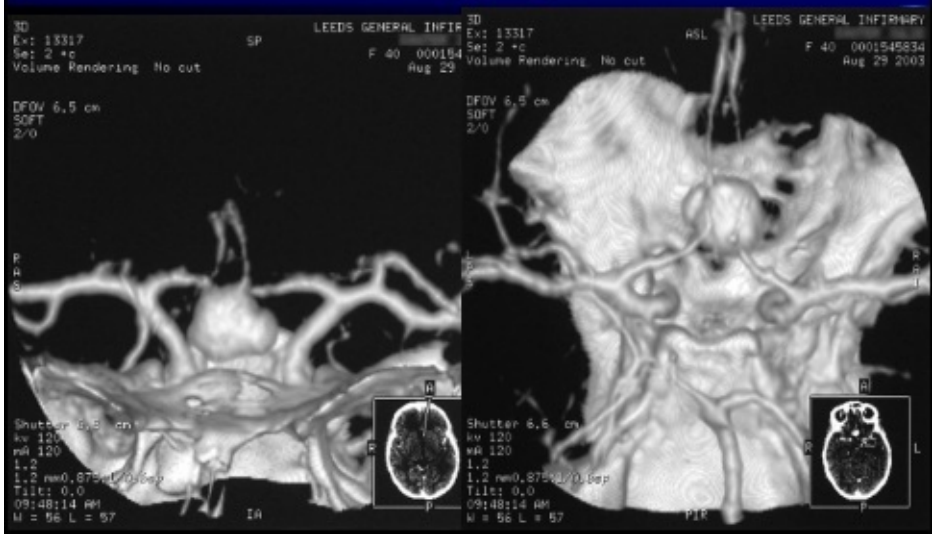
Advantages of MRI over CT

- Posterior fossa lesions
- White matter disease
- Brain stem lesions
- Venous sinus thrombosis
- Spinal cord disease
- Pregnancy
- Developmental anomalies of the nervous system

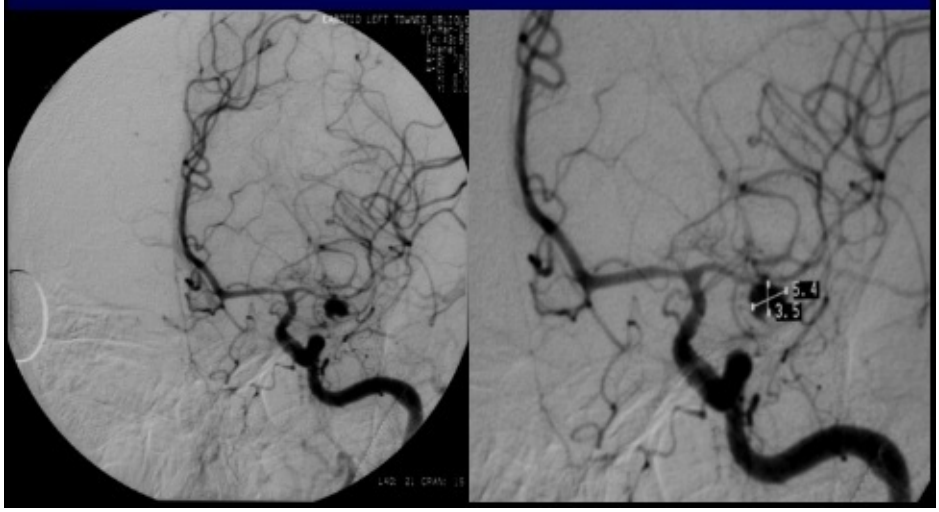
Angiogram



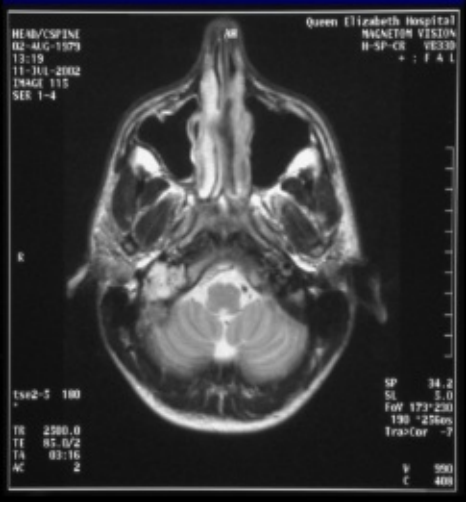
CT Angiogram



Angiogram



Angiogram



Investigations in Neurology

- CSF examination
- Neurophysiology :
  - EEG
  - NCS
  - EMG
  - SSEP
  - BSEP
  - VEP

Investigations in Neurology

- Nerve biopsy
- Muscle biopsy
- Brain biopsy
- Genetic studies

Document Outline