Ischaemic stroke in young adults

Dr Lillian Choy

Stroke Multidisciplinary Study Day

6th October 2010

Stroke

- 3rd most common cause of mortality in UK
- Leading cause of adult disability
- Incidence increases with age
- Also occurs in young adults
  - Up to 12% of first strokes occur in patients <45 years of age

Young stroke

- Under age of 45
- Reported incidence variable
  - Annual incidence of 10 per 100000 in UK
- 50% are ischaemic (compared with 85% in older patients)

Causes of ischaemic stroke

- Older adults
  - Atherosclerosis
  - Small vessel disease
  - Cardioembolism
  - Risk factors: Hypertension, smoking, cholesterol, atrial fibrillation, diabetes
- Young adults
  - Atherosclerosis and small vessel disease less common
    - 2% 15-30 year olds; 30-35% 30-45 year olds
  - Causes of stroke more diverse

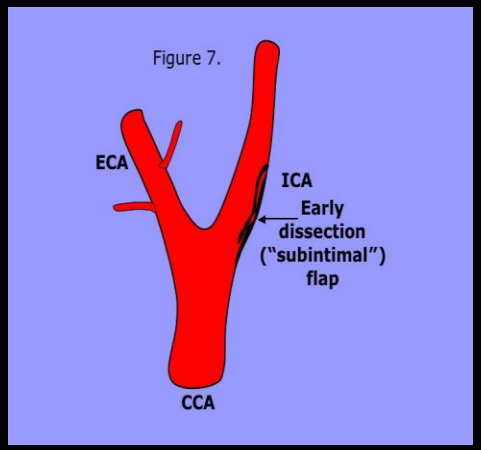
Causes

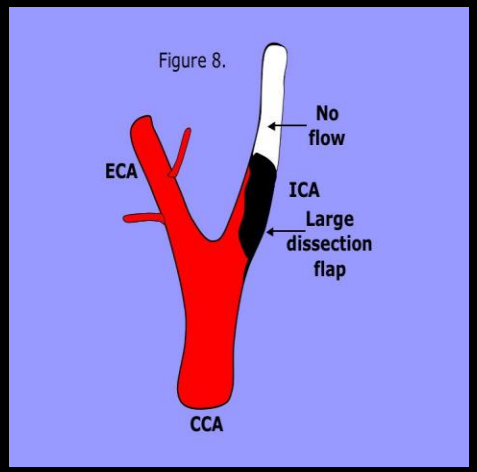
Arterial dissection

Carotid and Vertebral Artery Dissection

- 2% of all ischaemic strokes
- BUT
  - up to 10% of young adult stroke <45 yrs
  - up to 20-25% < 30 yrs
  - (compared to ~ 2.5% in older people)

What is arterial dissection?

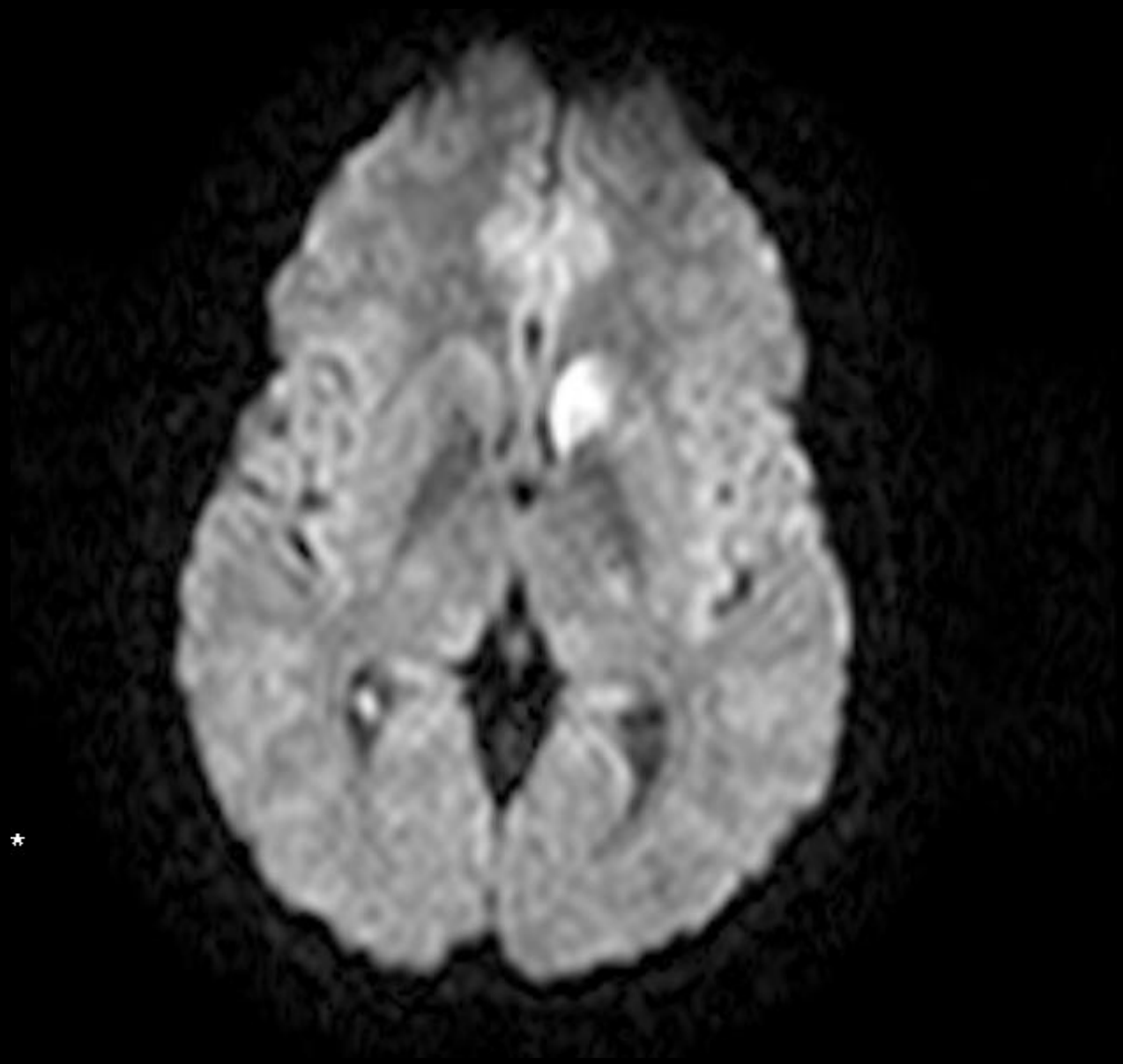


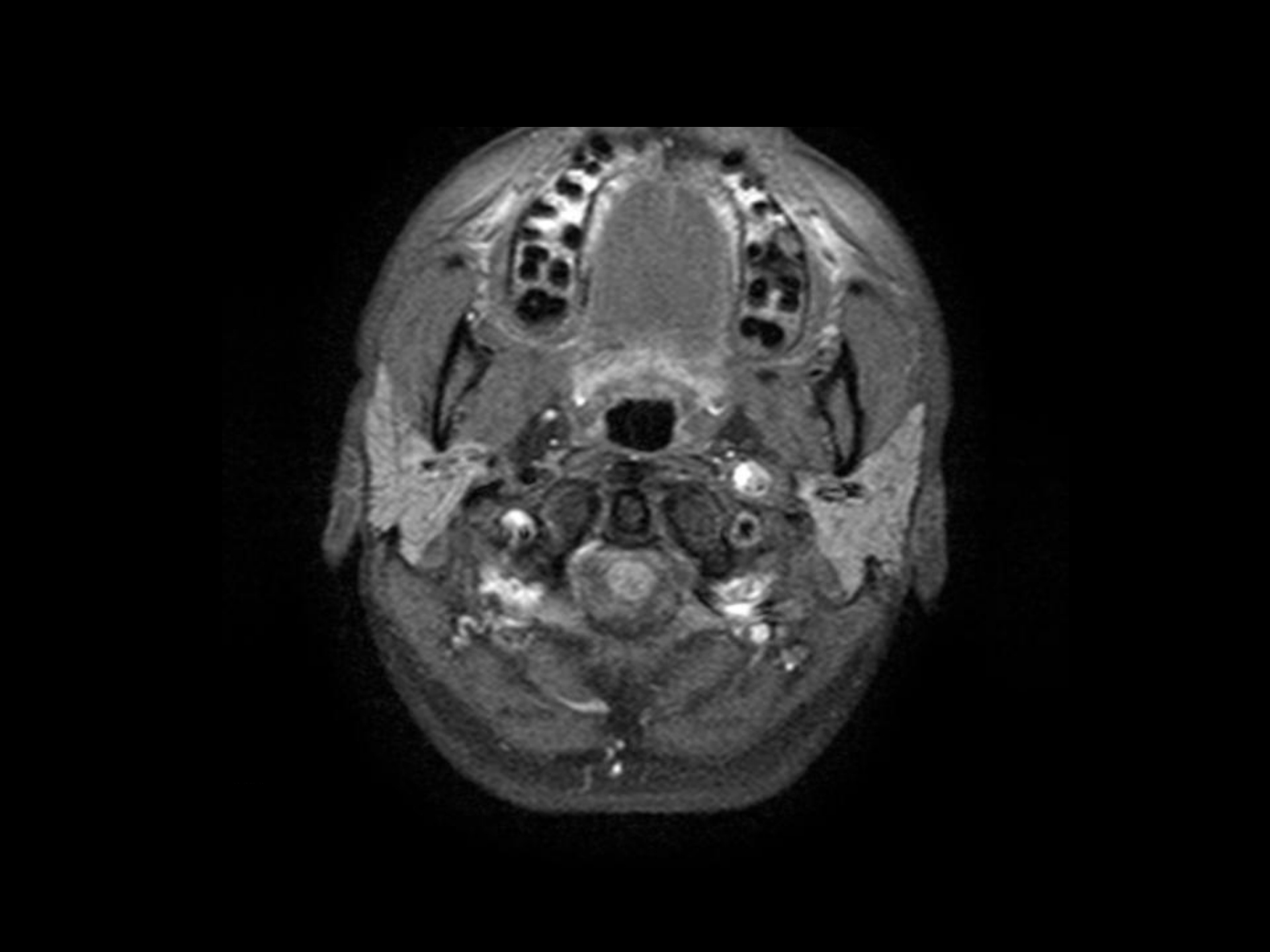


- Tear in the intima or media
- Bleeding within the arterial wall
- Bleeding tracks/dissects ciurcumferentially and longitudinally
- Ischaemic stroke due to
  - Embolisation of thrombus formed at the site of the tear into an intracranial artery
  - Occlusion of the dissected artery

Case 1

- 35 year old female
- 1/52 post partum – difficult labour, C section
- 4 episodes of transient difficulty speaking, right arm/leg weakness lasting for minutes each time
- Left sided neck pain
- No other PMH; no obvious risk factors





What causes arterial dissection?

Spontaneous

- Genetic connective tissues disorders (1-5%) – *Ehlers-Danlos, Marfan's, osteogenesis imperfecta, polycystic kidney disease, psuedoxanthoma elasticum*
- Fibromuscular dysplasia
- Cystic medial necrosis
- Possibly atheromatous risk factors (?) -*BP, DM, Smoking, cholesterol*

Traumatic

- Sports
- RTA
- Whiplash injury
- Neck manipulation *chiropractor*
- Minor precipitating events - *painting ceiling, reversing car, yoga, coughing, vomiting*

Clinical features

- Carotid artery dissection
  - Headache/neck pain
  - Horner's syndrome
  - TIA and stroke in carotid territory
  - Cranial nerve palsies
- Vertebral artery dissection
  - Neck pain, pain in occipital region, ears
  - TIA and stroke in vertebrobasilar territory

Symptoms usually within hours/ days of dissection but there may be delay of weeks or even months

When should the diagnosis be suspected?

- Clinical features as described on previous slide
  - Head or neck pain in a (young?) patient with neurological deficit
  - High index of suspicion even in the absence of obvious trauma

Treatment

- No consensus: variation in treatment regimes used
- Current treatment is with warfarin (INR 2-3 for 3-6 mths) or antiplatelets
- CADISS (Cervical Artery Dissection in Stroke Study) – antiplatelets vs warfarin

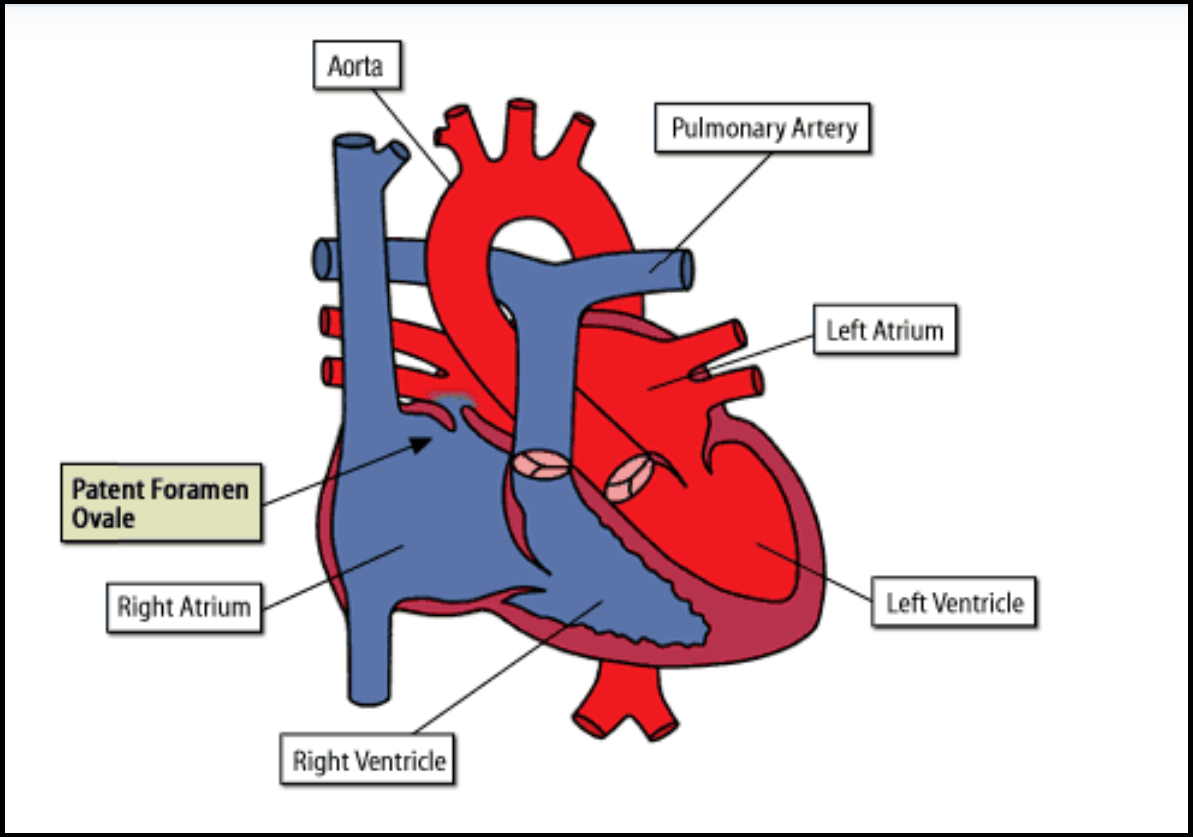
Causes

Cardioembolism

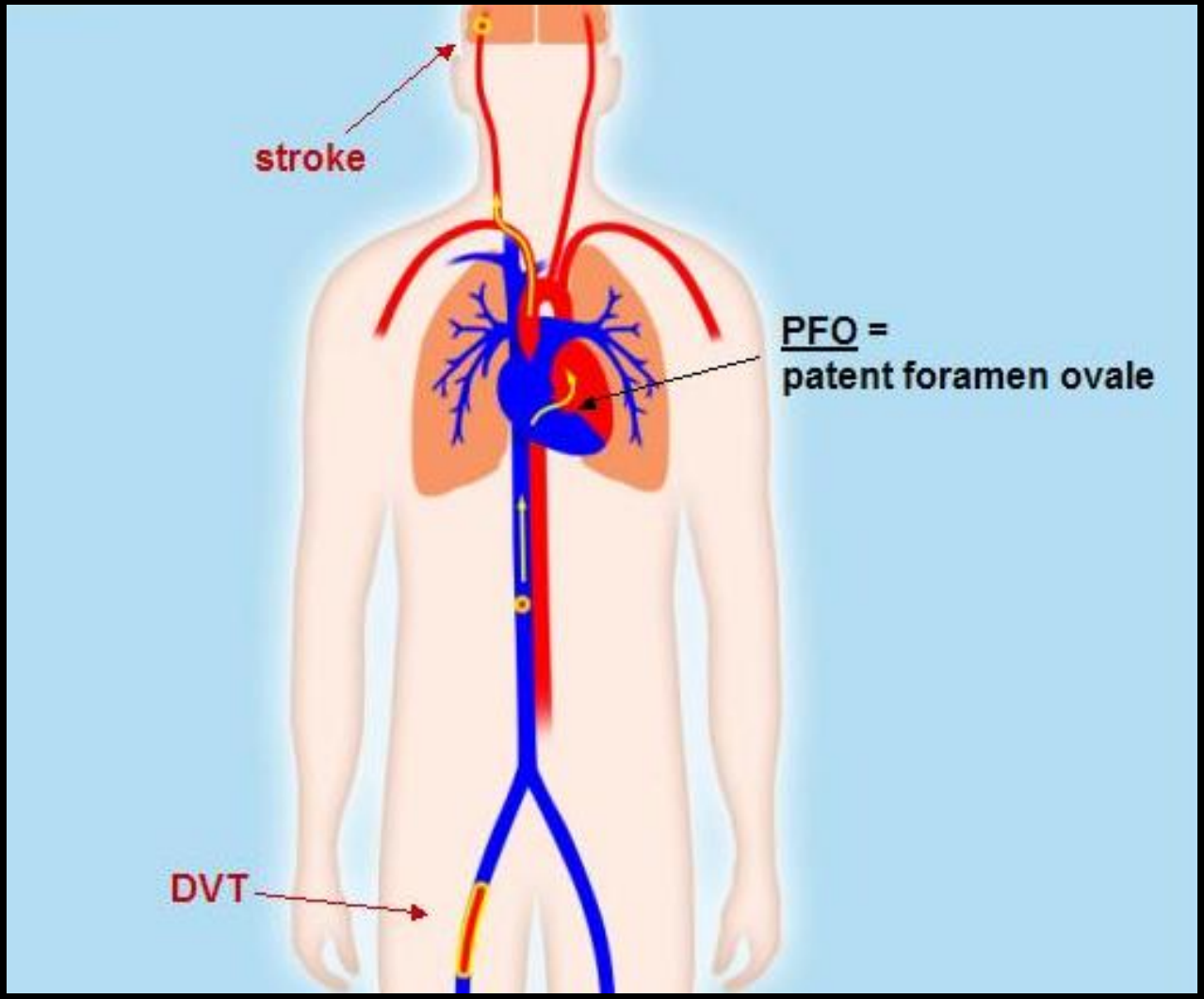
Cardioembolism

- 20-30% of young stroke patients
- Most common cardiac lesions
  - Prosthetic heart valves
  - Infective endocarditis
  - Dilated cardiomyopathy
  - Atrial septal aneurysm (ASA)
  - Patent foramen ovale (PFO)
- Diagnosed on transthoracic echo or transoesophageal echo

Patent foramen ovale (PFO)

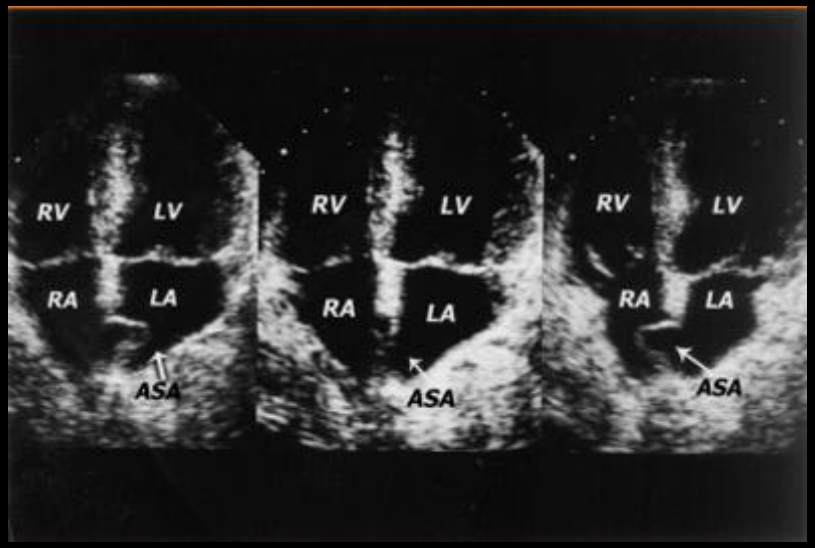
- 

How might PFO cause stroke?



Atrial septal aneurysm (ASA)

- Bulging of the inter-atrial septum into the right or left atrium or both
- Can be present in healthy people
- Associated with increased risk of stroke especially with a co-existing PFO



PFO and ASA

- Uncertain importance as cause of stroke
- PFO prevalence higher in young stroke pts compared with controls
- However other studies suggest risk of recurrent stroke in pts is low
- Management unclear
  - Percutaneous closure vs anticoagulation vs antiplatelets

Causes

Thrombophilia

Thrombophilia in stroke

- Rare, usually familial conditions in which spontaneous and recurrent thromboses occur – usually venous
- Protein C and S deficiency, activated protein C resistance
- Lupus anticoagulant and anticardiolipin antibodies
- Weak evidence in sporadic arterial stroke
- Small studies in young stroke have suggested an association

Causes

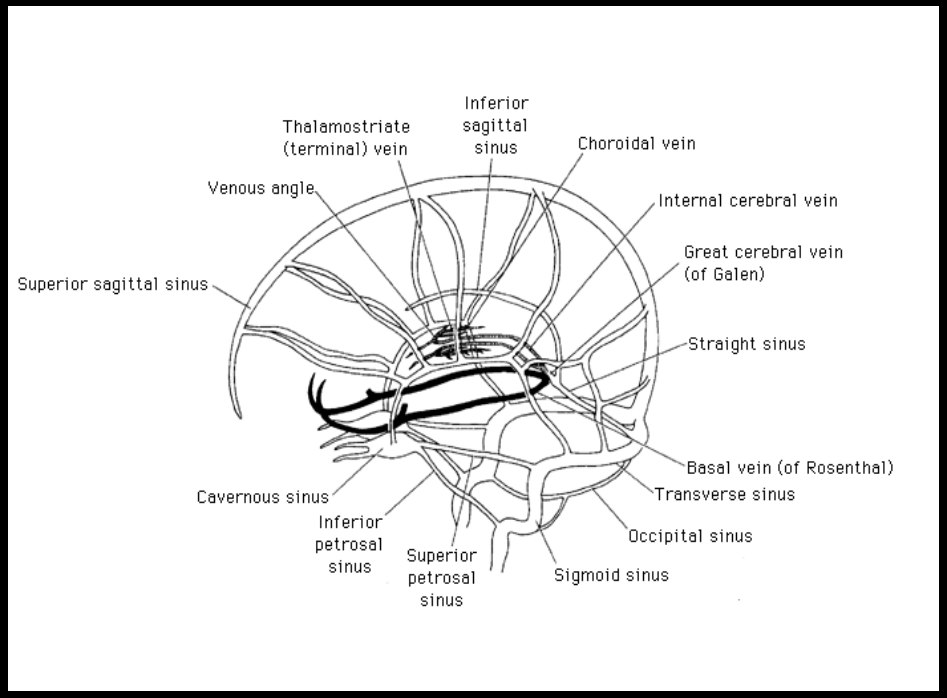
Cerebral Venous Thrombosis

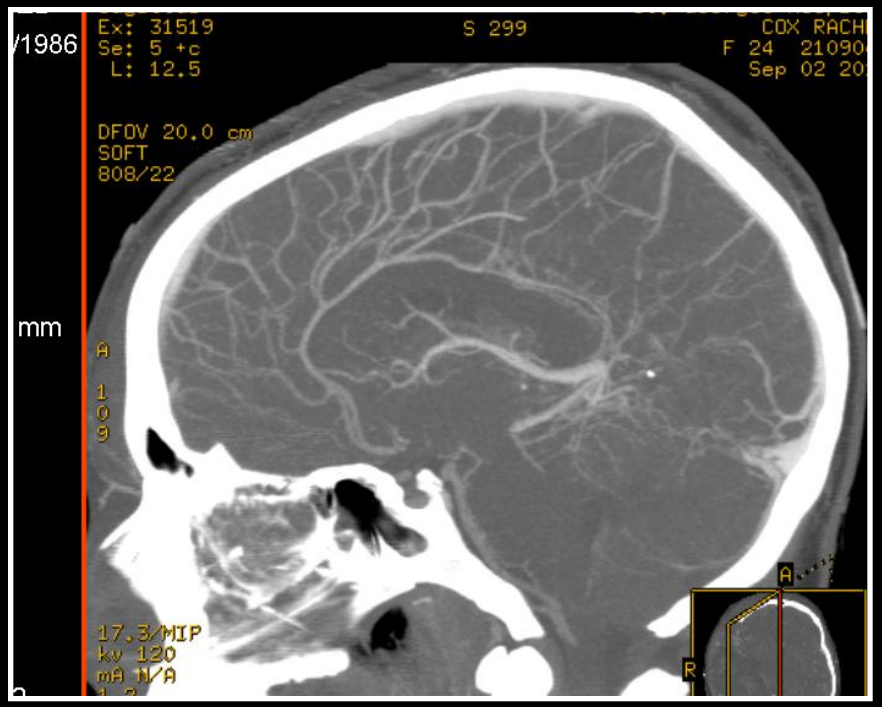
Case 2

- 24 year old nursery nurse
- Woke up 5am with severe headache, loss of vision
- GCS initially 14 on presentation
- Dropped to 9

- 2/12 history of headache
- 2/7 history of visual disturbance
- Smoker
- Overweight
- On the pill - microgynon
- Family history of deep vein thrombosis

Initial CT scan – 2 hours after onset of symptoms


Thalamostriate (terminal) vein
Inferior sagittal sinus
Choroidal vein
Venous angle
Internal cerebral vein
Great cerebral vein (of Galen)
Superior sagittal sinus
Straight sinus
Basal vein (of Rosenthal)
Transverse sinus
Cavernous sinus
Occipital sinus
Inferior petrosal sinus
Superior petrosal sinus
Sigmoid sinus


/1986
Ex: 31519
Se: 5 +c
L: 12.5
S 299
COX RACH
F 24 21090
Sep 02 20
DFOV 20.0 cm
SOFT
808/22
mm
A
1
0
9
17.3/MIP
kv 120
mA N/A
A
R

Cerebral venous thrombosis

- Headache
- Raised intracranial pressure with papilloedema
- Focal neurological deficit
- Seizures
- Cranial nerve palsies

Especially in a young patient who is or has recently been pregnant, has a past history of, or risk factors for venous thrombosis e.g. thrombophilia, oral contraceptive pill

Treatment

- Limited evidence from randomised trials
- Usually treated with anticoagulation (heparin followed by warfarin), even in the presence of haemorrhage
- Prognosis often good with aggressive treatment
  - International Study on Cerebral Vein and Dural Sinus Thrombosis – 624 pts:
    - 79% complete recovery
    - 13.4% dead or dependent

Day 2: Post op scan

Day 8: 5 days after starting heparin

Differential diagnosis of ischaemic stroke in young adults

- Arterial dissection
- Haematological – thrombophilia, polycythaemia, thrombocythaemia, antiphospholipid antibody, thrombotic thrombcytopaenic purpura, cancer
- Rheumatic and inflammatory – SLE, rheumatoid arthritis, sarcoid, Sjogren's, PAN, primary CNS angiitis
- Cardiac – PFO, myocardiomyopathy, arrhythmias, endocarditis, atrial myxoma, prosthetic heart valves,
- Female hormone related – oral contraceptive pill, pregnancy, dural sinus occlusion
- Premature atherosclerosis – hypertension, diabetes, smoking, homocysteinuria, hyperlipidaemia
- Others: moyamoya, Behcets syndrome, Takayasu's syndrome, Sneddon's syndrome, fibromuscular dysplasia, Fabry's disease
- Drugs – cocaine, heroin, amphetamines
- Genetic - CADASIL
- Venous stroke

Prognosis in young stroke

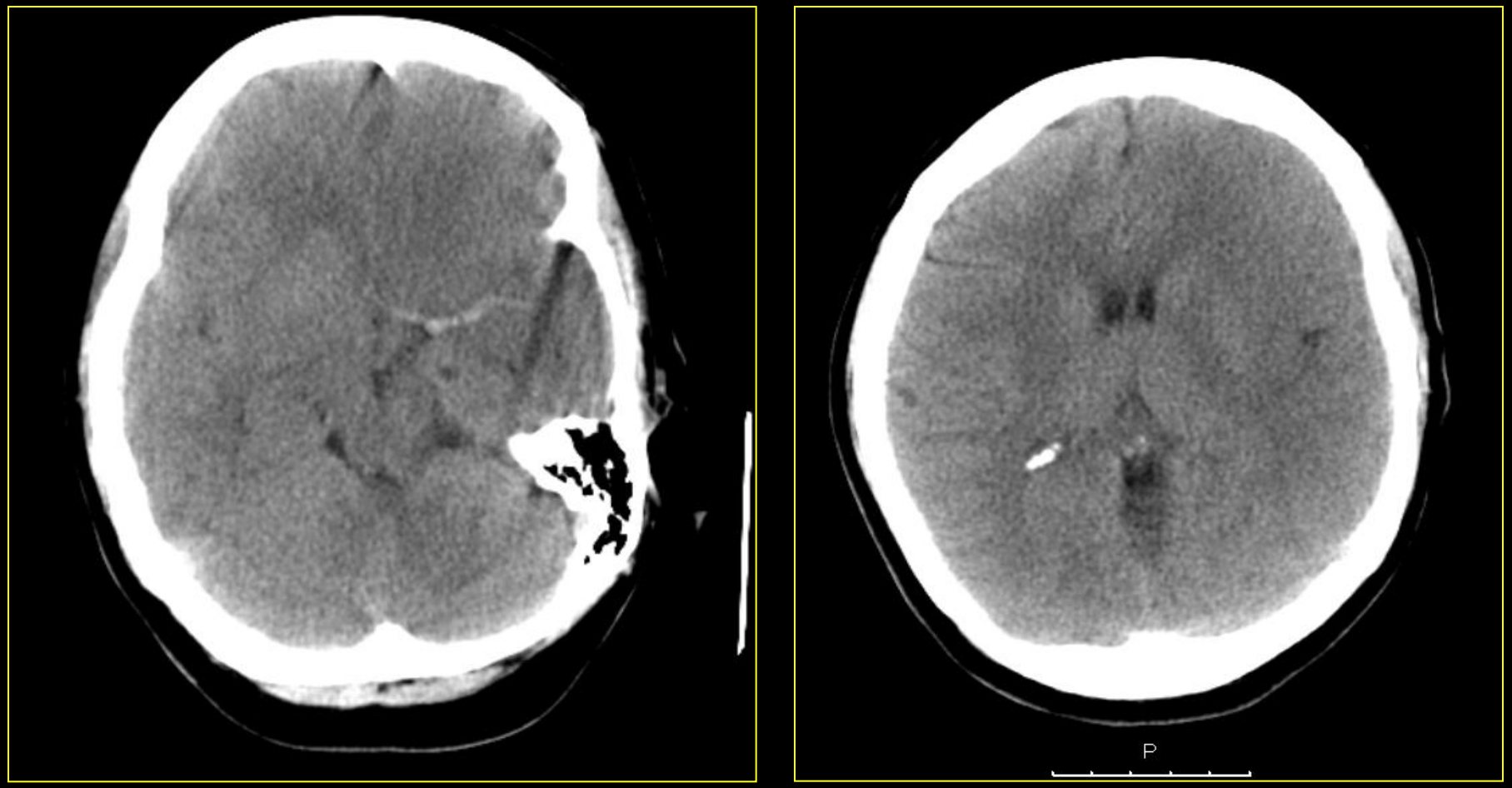
- Initial mortality: 2-7%
- 1-3% risk of recurrent stroke per year
- No underlying cause found in up to 40%
- Low risk of recurrence if no underlying cause found: 0.5-1% per year
- Greater potential for recovery compared with older adults

Malignant MCA infarction in young stroke

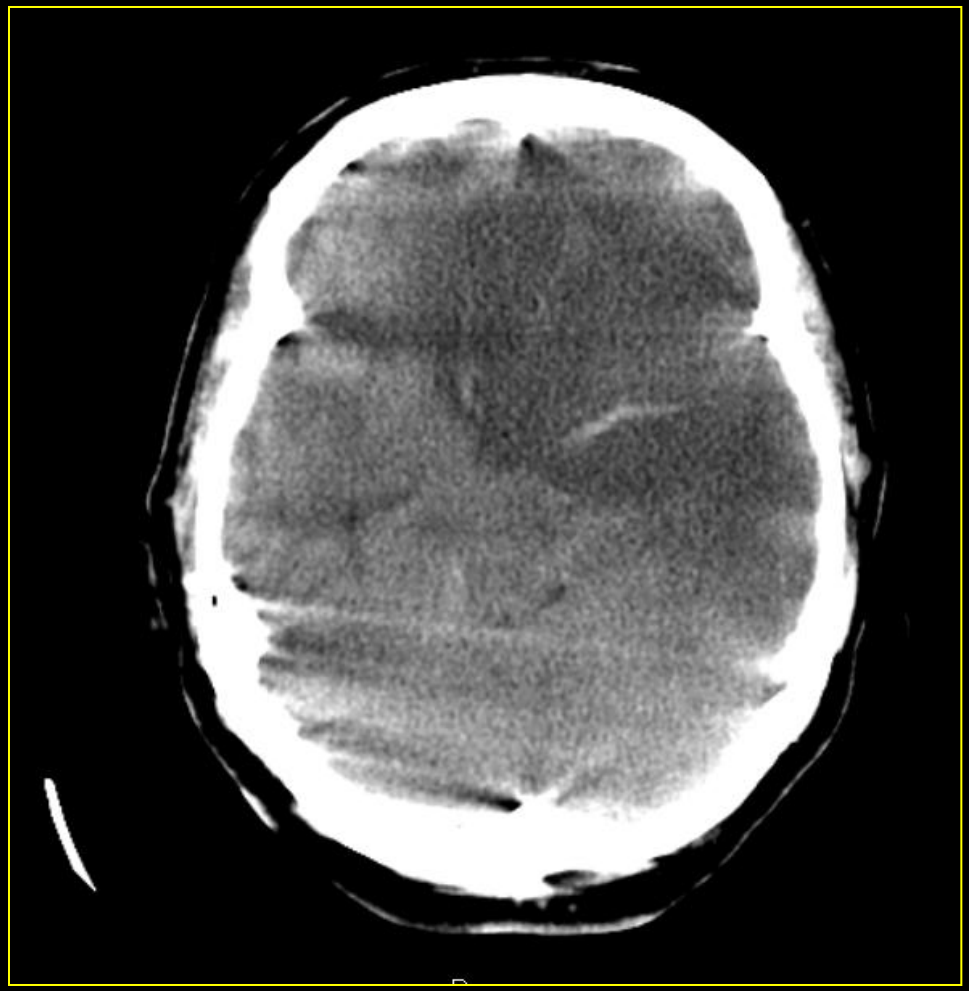
Decompressive hemicraniectomy

Case 3

- 44 year old woman
- No past medical history
- Found drowsy in bed in the morning
  - Unable to speak
  - Right sided weakness



Initial CT scan – day 1



Day 2

Malignant MCA infarction

- Gaze deviation, hemiplegia, visual field defect, aphasia or neglect
- Early/rapid neurological deterioration
- Headache
- Vomiting
- Poor prognosis – 80% mortality
  - Transtentorial herniation
  - Brainstem compression

Decompressive hemicraniectomy

- Removal of a large bone flap on the side of the stroke and dura opened to relieve pressure
- Life saving operation
- Early identification of at risk patients; operated on by a maximum of 48 hours
- Results less good with older patients
  - Current NICE guidelines <60 years

Day 4: post hemicraniectomy

Summary

- Large differential diagnosis in ischaemic stroke in young adults
- Arterial dissection and cardioembolism are important causes
- Arterial and venous strokes