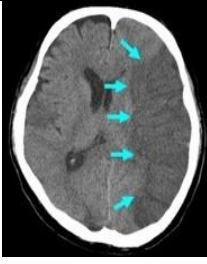


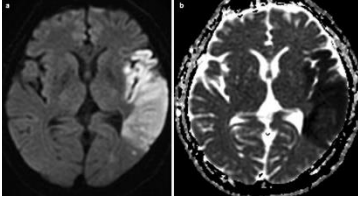
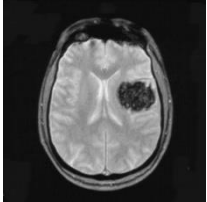
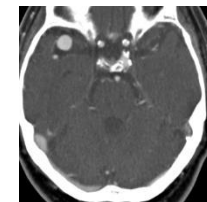


STROKE MEDICINE SUMMARY FOR STUDENTS

Stroke Types	Ischaemic (80%)	Haemorrhagic (15%)	Subarachnoid Haemorrhage (5%)
CT/MRI Appearance	 <p>May be normal initially or may show hyperdense MCA or other vessel, loss of grey white differentiation loss of insular ribbon. Later hypodense. Small round subcortical rounded (small vessel) lacunar infarcts or large wedges of (large vessel) subcortex/cortex.</p>	 <p>Always instantly abnormal so CT is the great differentiator. Should see hyperdense blood. A normal scan rules out ICH. Blood goes with time over weeks/months.</p>	 <p>CT done within 6 hrs is 99% sensitive for SAH. Blood most dense around aneurysm if that is source. Commonest on Ant comm Artery, Middle cerebral artery, Post comm Artery and Basilar artery.</p>
	 <p>MRI: DWI/ADC show L MCA infarct</p>	 <p>MRI: Gradient Echo/T2* and SWI show blood as black</p>	 <p>CTA: Aneurysm on R MCA aSAH = SAH secondary to an aneurysm</p>
Risks	Age, AF, HTN, IHD, Lipids, Diabetes, smoking, alcohol excess	Male sex, Age, HTN, race, alcohol excess	Genetics, Smoking, HTN
Causes	Cardioembolism: AF, Endocarditis, Valves, Mural, myxoma, Atheroma plaque rupture e.g. Carotid stenosis. Dissection, Cerebral venous thrombosis. Small vessel (lacunar) disease. Rare: Vasculitis, Migraine	Hypertension, Cerebral Amyloid angiopathy (age>70), Anti-coagulants. Exclude trauma as well as Bleed from AVM, Cavernoma, Tumours, Aneurysms	Berry (Saccular) Aneurysms, AV Malformation, Peri-mesencephalic (Normal DSA benign), Trauma, Anticoagulants. Proven Non aSAH may come to stroke team.
Investigations	FBC, ESR, U&E, LFT, lipids, Glucose, ECG (AF/MI/LVH), CXR. Carotid Doppler: Non-disabling anterior circulation strokes or TIA. Transthoracic Echo: Murmur, Cardiac symptoms, abnormal ECG, Endocarditis. Strokes < 45 and no cause: MRA, Thrombophilia screen, Vasculitis screen, Bubble echo	FBC, ESR, U&E, LFT, lipids, Glucose, ECG (LVH), CXR, Coagulation check INR. MRI/A + Gad or CT + Contrast at 6-12 weeks to look for persisting structural causes	FBC, ESR, U&E (Low Na is common), LFT, lipids, Glucose, ECG, CXR LP needed after 12 hrs if thunderclap headache and normal CT after 6 hrs to look for RBCs and Xanthochromia. Cerebral angiography to look for aneurysms or AVM
Management	HASU. Check BM. Consider ITU if GCS < 9. ABCs. IV fluids if NBM/Poor intake or dry. Thrombolysis: Alteplase if within 4.5 hours of onset (3 hrs if > 80) and no contraindications (see left) and CT compatible. Mechanical Thrombectomy < 6 hrs of onset, Large vessel occlusion (M1, Carotid T) on CTA and NIHSS > 6 (+/- Alteplase) (<24 hrs with Clinical-core mismatch on CTP or MRI). Malignant MCA: Decompressive hemicraniectomy Antiplatelets: Aspirin 300 mg PO/NG/PR 2 weeks then Clopidogrel 75 mg od. Some give combined for 3 weeks. BP control: Labetalol 10-20 mg slow IV which can be repeated if BP > 220 mmHg or > 185/110 mmHg and for alteplase. Diabetic control: VRIII if needed to keep Glucose 5-15 mmol/l. Exercise, Stop Smoking, Anticoagulate AF: DOAC or Warfarin at 7-14 days. Cholesterol: Start Atorvastatin 20-80 mg daily. Carotid Endarterectomy: (CEA) Non-disabling stroke: a symptomatic carotid stenosis of 50-99% (NASCET method) should be considered for CEA within 7 days of symptoms. Rehabilitation: SLT. OT/PT 45 mins/day as needed.	HASU/ITU if GCS < 9. IV fluids if NBM or poor intake or dry. ABCs, If SBP > 150 mmHg acutely then aim for SBP of 140 mmHg for 7 days unless GCS < 5, End of life care, immediate surgery or structural cause. Avoid Nitroprusside. IV Labetalol 10-20 mg slow IV over 2 mins which may be repeated. Amlodipine 5 mg PO/NG or ACEI PO. Monitoring. Surgical consult. Rehabilitation OT/PT/SLT Reverse Any Anticoagulation Warfarin: 4-factor prothrombin complex concentrate + IV Vitamin K. Dabigatran: Praxbind 5 g IV or haemodialysis. Factor Xa inhibitor: Rivaroxaban, Apixaban, or Edoxaban: 4-factor prothrombin complex concentrate (e.g. Octaplex, Beriplex) Surgical management: refer all patients. Cerebellar haematoma > 3 cm, hydrocephalus needing external ventricular drain, cortical bleeds near brain surface and low GCS. Long term Rehabilitation	Admit ITU. Most have suspected aneurysm (aSAH) or AVM are admitted under Neurosurgery/ITU. Intubate/ventilate if low GCS and lower ICP. Monitor ICP. Lower SBP < 160 mmHg may reduce rebleed risk. Clipping or coiling of aneurysms. Main risk is rebleeding and vasospasm. Nimodipine given to prevent vasospasm Hydration. IV fluids. Long term Rehabilitation as needed. aSAH do not usually come to the stroke team. Clip inserted after craniectomy by neurosurgeon Coil inserted endovascularly by interventional neuroradiologists into the aneurysm and causes thrombosis
References	<p>RCP guidelines 5th Edition 2016</p>		
Arterial Syndromes and Aetiology		Right Sided Stroke (Side of the brain pathology)	Left Sided Stroke (Side of the brain pathology)
Middle cerebral artery (MCA)	Cardio-embolism, carotid disease with artery to artery embolism, local atherosclerosis.	Left HP (FAL Arm weakest), Left HS, Left HH (can't see to left), Left Hemineglect/anosognosia	Right HP (FAL arm weakest), Right HS loss Right HH (can't see to right) Aphasia (language)
Anterior Cerebral Artery (ACA)	Cardio-embolism, carotid disease with artery to artery embolism, local atherosclerosis.	Left HP (FAL leg weakest) Abulia, urinary incontinence	Right HP (FAL leg weakest) urinary incontinence, Aphasia, Change personality
Posterior Cerebral artery (PCA)	Cardio-embolism e.g. AF or posterior circulation (subclavian/vertebral/basilar) atherosclerosis and artery to artery	Left HH, cognitive and other memory issues	Right HH, cognitive, memory issues, aphasia

Basilar and Vertebral arteries	Supplies Brainstem (Midbrain (3/4) Pons (5/6/7/8) Medulla (9/10/11/12) and cerebellum	R cranial nerve palsies. R cerebellar signs, R Horner's if R lateral medulla. Left HP Pontine: locked in syndrome	L cranial nerve palsies L cerebellar signs L Horner's if L lateral medulla. Right HP Pontine: locked in syndrome
--------------------------------	---	--	---

Bamford Classification: useful clinically HP = hemiparesis HS = hemisensory loss HH = Homonymous hemianopia

Brain supplied by R/L Internal Carotid arteries (Ant circulation) and R/L Vertebral arteries (Post circulation). Distally connected by Circle of Willis

Stroke Type (All = red, some = green)	Hemiparesis or Hemisensoryloss	Homonymous Hemianopia	Dysphasia or hemi neglect	Vertigo, dysphagia, diplopia, cerebellar signs	Notes
Total anterior circulation (TACS) 20%	Yes	Yes	Yes	No	Large cortical stroke in MCA/ACA areas.
Partial anterior circulation(PACS)35%	Yes/No	Yes/No	Yes	No	2/3. Smaller cortical stroke in MCA/ACA areas
Lacunar stroke (LACS) 25%	Motor/Sensory/Sensory+Motor Ataxic Hemiparesis	No	No	No	Subcortical stroke due to small vessel disease Subcortical/pons
Posterior circulation (POCS) 25%	Yes/No	Yes/No	NO	Yes	Cerebellar or brainstem syndromes

Complications	Prevention and Management
General	Good positioning and support weight of affected arm to protect shoulder. Good nursing care. Skin protection. Catheter care. 7-day x 45 mins OT/PT to work on physical and functional goals to optimise recovery and return of function. SLT for speech, language and swallowing. Clinical Neuropsychology for mood and cognition issues. Multidisciplinary teamworking in stroke care saves lives and reduces disability. Early supported discharge where possible.
Ischaemic Stroke recurrence	Use of Aspirin 300 mg acutely. Long term stroke prevention – antiplatelets, Anticoagulate AF after CHADSVASC HASBLED risk assessed. Statins. All strokes - manage BP. reduce alcohol, stop smoking, exercise.
Cerebral Oedema	Fall in GCS after MCA infarct at 24-72 hours. Use IV N-saline not Dextrose CT diagnostic. Referral to neurosurgeons for discussion on Hemicraniectomy.
Enlarging Haematoma	Fall in GCS. Cerebellar Haematoma > 3 cm. Superficial supratentorial bleeds. CT diagnostic. Referral to neurosurgeons for discussion on haematoma evacuation and/or decompressive Surgery +/- External ventricular drainage for hydrocephalus. Manage SBP to 140 mmHg
Obstructive Hydrocephalus	Bleed into ventricles or oedema obstructs the ventricles. A CT is diagnostic. Referral to neurosurgeons for discussion on Surgery +/- External ventricular drainage for hydrocephalus
Seizures/status epilepticus	Lorazepam for status epilepticus. IV Phenytoin/Equivalent. Some may need long-term anticonvulsants. Always consider Non-convulsive status in any patient with hypoactive delirium.
DVT/PE	Early mobilisation, Intermittent Pneumatic compression, LMWH selected cases IPC for all who are immobile. If PE suspected then CTPA diagnostic. If DVT suspected needs USS. Anticoagulation. Consider IVC filter for those we cannot be anticoagulated due to ICH with VTE
Swallowing	Swallow Screening Assessment acutely before oral intake to prevent aspiration. If problems identified then Speech and language therapy (SLT) assessment. Prevent Aspiration pneumonia. May need IV antibiotics, chest physiotherapy, Sitting out as tolerated
Nutrition	Encourage oral intake when possible. If unsafe swallow or other reasons consider NG feeding but does not prevent aspiration of refluxed feed. Involve dieticians. Weigh patient. Assess BMI. Be aware of 'MUST' Calculator to establish nutritional risk.
Falls	Falls are a risk of mobilisation. A multifactorial & interdisciplinary approach is required to minimise the risks & reduce/prevent falls. Implement strategies as a team. Risks of mild to severe injury, loss of confidence, anxiety and prolonged immobility.
AF/Heart failure	Avoid fluid overload. PO or IV Beta blockers, PO or IV Digoxin for fast AF. Furosemide for fluid overload. Anticoagulate AF at 10-14 days in Ischaemic stroke with DOAC/Warfarin usually. Assess CHADSVASC and HASBLED scores.
Continence	Manage constipation. Catheter for retention and TWOC when possible. Try to ensure privacy and dignity when toileting. Start a toileting regimen. Look for and treat UTI. Usually multifactorial and improves but needs monitored and managed.
Skin	Keep skin dry and protected and 2 hourly turns to monitor for and prevent pressure sores. Review by nurses and doctors and specialist teams. Nutrition important.
Mood	Assess using validated tools and support psychological needs. Be sensitive to needs. Supportive empathetic care. Consider antidepressant and monitor. Involve family in management and support them with information and advice.
Death and End of Life care	30-day mortality Acute Ischaemic stroke 15% SAH 35% ICH 40%. Haemorrhage worse outcomes. Explore "What would the patient have wanted us to do". Follow NICE EOL guidance. Trials of fluids as appropriate. DNACPR after discussion with patient or those close to patient. Prepare family. Compassionate empathetic care. Access to appropriate medications.

TIA Syndromes	
	A TIA is in theory a clinical "stroke-like" syndrome due to a temporary transient arterial occlusion that warns that an acute ischaemic stroke may be imminent. Most resolve within 10-20 mins though definition is < 24 hrs. Refer to TIA clinic – to make the right diagnosis from TIA mimics (migraine/syncope/TGA/hypoglycaemia etc), diagnose AF and anticoagulate, find carotid stenosis needing endarterectomy and to start best medical therapy (clopidogrel + statin) and advise about lifestyle (smoking/exercise/alcohol) and driving – stop for 28 days. See all asap but urgently (Same day) if Age > 60 (+1), Duration > 10-59 min (+1) > 60 mins (+2), Unilateral weakness (+2), Loss of speech no weakness (+1), BP ≥ 140/90 mmHg (+1) Diabetes (+1) and score >3. If score 6-7 then 2-Day Stroke Risk: 8.1%, 7-Day Stroke Risk: 11.7% and 90-Day Stroke Risk: 17.8%