Stroke

Epidemiology: Stroke is the third commonest cause of death in the western world and the most common cause of disability among adult. Incidence is roughly 2/1000/year. 85% are ischemic stroke, 10% hemorrhagic stroke (intra cerebral hemorrhage, ICH), 5% subarachnoid hemorrhage, SAH.

- 50% have mild symptoms, lasting < 1 week
- 25% have moderate symptoms, 1-3 months of rehabilitation
- 25% have severe disability, becomes dependent or dies

Stroke definition: Sudden onset, focal deficit, presumably of vascular origin. Lasting longer than 24 hours or leading to death.

Ischemic stroke:

Atherothromboembolism (50%). Thrombus in large vessel, artery-to-artery emboli, hemodynamic stroke.

Intracranial small vessel disease (25%). Lacunar stroke due to atherothombosis of perforant arteries.

Cardioembolic (20%). Atrial fibrillation, mural thrombus, valve disease, endocarditis, patent foramen ovale, myxoma.

Rare/other causes (5%). Dissection, vasculitis, anti-phospholipid antibody syndrome, substance abuse, migraine, CADASIL, mitochondrial disease.

Treatment, acute: iv t-PA, i.e. thrombolysis. Indication: Age > 18, treatment can be started < 4.5 hours after "last seen well", not dependent. Exclusion: Major surgery, stroke or trauma < 3 months ago, minor surgery < 10 days, INR > 1.4, BP > 185/110.

Thrombectomy. Inclusion: Occlusion of a large vessel (ICA/MCA/VA/BA), treatment can be started < 6 hours after last seen well, stroke must be severe (NIHSS > 10), not dependent. No real contraindication. Thrombectomy can be performed in a patient with contraindications for iv t-PA or in a patient non-responsive for iv-tPA.

Diagnostic work-up/secondary prophylaxis: Aspirin, statin, treatment of hypertension, smoking cessation, optimizing of diabetes treatment, US of the carotids and carotid endarterectomy if stenosis > 50% on relevant side. Cardiology consult and hypercoagulation panel in selected patients.

ICH:

Hypertension related. Thought to be caused by Charcot-Bouchard aneurysm on perforation arteries developed due to long standing hypertension. Typical locations are basal ganglia, thalamus, pons, cerebellum.

Cerebral Amyloid Angiopathy (CAA). Caused by amyloid deposition in cerebral vessels. Often in elderly. Location is lobar, often occipital. Microbleeds visible on T2* images.

Aneurysm. One in every 13 aneurysm causing SAH also ruptures into the parenchyma, causing an ICH. Findings include an ICH close to typical aneurysm locations near the large vessel and a coexisting SAH.

Arteriovenous malformation, AVM. Tangle of dilated vessels between arteries and veins. Bleeding occurs when these vessels burst. Bleeding often lobar, but can be deep. Calcifications can occur. ICH in a young person without risk factors warrants a CT- or MR angio.

Cavernous malformation. Thin walled vascular structures. Single or multiple, occasional calcified. 50% in hemispheric white matter/cortex, 1/3 in posterior fossa/brain stem, 1/6 in basal ganglia/thalamus. Hemorrhage often small, rarely fatal.

Bleeding in tumor. Irregular appearance of ICH, multiple ICHs, disproportionate degree of edema, enhancement after contrast administration, multiple tumors on scan. Underlying tumor can be glioblastoma or metastasis, e.g. melanoma, lung cancer, renal cancer or choriocarcinoma.

ICH treatment: Lowering blood pressure, reversing any coagulopathy. Surgery in selected patient: Cerebellar hematoma > 3 cm, large hemispheric bleedings that are life threatening. Surgery/endovascular closure of aneurysms and AVMs.

SAH:

Clinical spectrum ranges from sudden onset of headache (often worst in life), to depressed level of consciousness, coma and death.

Rupture of saccular aneurysm (85%). Often more extensive bleeding in the basal cisterns. Can break through to the ventricles or to the parenchyma.

Perimesencephalic SAH (10%). Bleeding often only around the mesencephalon, i.e. in the supracellar cistern and ambient cisterns. Angio without aneurysms. Benign course.

Rare causes (5%). Intracranial arterial dissection, mycotic aneurysms.

Complications of SAH	Treatment
Rebleeding.	Secure the aneurysm. Surgery (clip) or endovascular (coil).
Vasospasm.	“Tripel H”, hypertension, hemodilution, hypervolemia. Endovascular
Hydrocephalus.	Extra ventricular drain, lumbar drain, VP-shunt.
Seizure.	Anti epileptic drugs