The patient with neurological and psychological disorders

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Abstract

'Neurological disease' is a broad term used collectively to describe a wide range of disorders affecting the brain, spinal cord or peripheral nerves. The World Health Organization has estimated that neurological (including neuropsychiatric) conditions account for over 11% of the overall burden of disease in high-income countries. These conditions may be life threatening, many are symptomatically disabling and all have the potential to negatively affect quality of life. Patients with neurological and psychiatric disease are at increased risk of perioperative complications with common themes emerging, notably the challenges of perioperative medication management and the impact of associated co-morbidity. This article will explore commonly encountered disorders and the perioperative issues pertinent to these patients and those caring for them.

Keywords Antiepileptic medication; cerebrovascular disease; delirium; dementia; depression; epilepsy; neurological disease; Parkinson's; perioperative management; stroke; TIA

Stroke/TIA

Stroke is defined by the World Health Organization as 'rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death' deemed to be of vascular origin. When symptoms last less then 24 hours this is a 'transient ischaemic attack' (TIA) which may herald completed stroke. Non-disabling stroke refers to symptoms that last beyond 24 hours but resolve leaving no deficit.[1] Incidence increases rapidly with age.

The 2014 report of the Sentinel Stroke National Audit Programme (Royal College of Physicians UK) showed that the aetiology in most cases is ischaemic (88%) caused by vessel narrowing (usually thrombotic) or embolus with only 11% caused by cerebral bleeding (haemorrhagic strokes). Clinical features depend on the area of brain affected; common symptoms include limb/facial weakness, hemi-sensory loss, and disorders of language such as aphasia.

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Perioperative issues

Timing of surgery: NICE recommends that patients with TIA and stable, non-disabling stroke should have carotid artery imaging within 2 weeks of symptom onset and intervention if carotid stenosis is sufficiently severe (50% or 70% depending on criteria).[1] Carotid stenting has been trialled but current evidence supports carotid endarterectomy as the treatment of choice in these cases.[2] Timing of non-stroke-related surgery depends on the condition of the patient and the urgency of surgery; elective surgery should be deferred for at least 3 months. This time can be utilized to address co-morbid conditions pharmacologically or by lifestyle modification (e.g. smoking cessation). Symptoms of ischaemic heart disease should be elucidated preoperatively and severe or uncontrolled symptoms referred to a specialist.

Medicines management: coronary artery disease, hypertension and atrial fibrillation (AF) are common co-morbidities.

Medication prescribed to control AF and β-blockade should be continued. Withdrawal of statins increases the risk of postoperative stroke. Angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers may cause exaggerated hypotension under anaesthesia however conclusive evidence of harm has not been demonstrated. A tailored approach taking into account the indication for the drug, the current haemodynamic status and the planned surgery is suggested.[3] Diuretics are usually omitted on the morning of surgery. Reintroduction of antihypertensive drugs should be considered once the patient is haemodynamically stable, if epidural analgesia is ongoing then caution must be exercised due to its vasodilatory effect.

Patients with known cerebrovascular disease are at an increased risk of death from thromboembolic causes and are usually prescribed anticoagulant or antithrombotic medications. Perioperative cessation of these combined with the hypercoagulable state induced by surgery heightens thromboembolic risk; continuation risks bleeding complications. This area of practice is complex; recent evidence suggests that bridging therapy in all but the highest risk cases may do more harm than good. Thromboembolic risk and bleeding risk must be assessed and balanced with the aim to minimize interruption to therapy.

Patients at highest risk of arterial thromboembolism are those:

- with recent stroke or TIA in the past 3 months (6 months if in presence of a mechanical heart valve)
- with a CHADS2 score of 5 or 6.

These patients may benefit from perioperative bridging with a short-acting agent (usually low-molecular-weight heparin), especially if warfarinized as it requires a longer cessation and reloading period than other anticoagulant drugs such as the factor Xa inhibitors.

Aspirin is often stopped 5 days prior to surgery and the recent POISE-2 trial did not show an increase in death or myocardial infarction at 30 days when aspirin monotherapy had been stopped prior to non-cardiac surgery.[4] Patients on antithrombotic therapy following cardiac stenting (especially if recent) or those listed for carotid endarterectomy often continue antithrombotic therapy and should be managed according to international guidance on this subject with reference to local policy.[3]

Stroke-related morbidity: the resultant disability from stroke ranges from no deficit to full dependency. Swallowing may be

uncoordinated and impaired airway reflexes may lead to recurrent aspiration pneumonia. Patients with severe deficit are often immobile, malnourished and underweight. Consequentially these patients are at risk of pressure sores and hypothermia. Positioning and protection of pressure areas must be meticulous and mindful of existing flexion contractures throughout hospitalization. Nutritional plans for these patients are vital and could mean the difference between surviving or not. Communication and cognitive difficulties may be evident with implications for consent.

Epilepsy and convulsive status epilepticus

Seizures result from abnormal neuronal activity, often excessive synchronous discharge. Manifestation is dependent on the area of brain affected and may comprise motor, sensory or autonomic elements or areas of consciousness and cognition for example memory. 'Epilepsy' is a continuing demonstrable predisposition to seizures affecting 0.5–1% of the UK population.[5] In the majority of cases there is no specific attributable cause although stroke, tumours and infection may be responsible. Other important precipitants include hypoxia, metabolic derangements (electrolyte disturbance, hypoglycaemia), alcohol withdrawal and febrile illness in infants.

Most convulsive seizures will terminate spontaneously within a few minutes; the definition of convulsive status epilepticus has therefore recently been redefined in order to reflect the operational implications of continuous seizure activity whereby any seizure lasting more than 5 minutes is recognized as generalized convulsive status epilepticus and requires pharmacological intervention.[6] Intravenous lorazepam (0.1 mg/kg) is the agent of choice but rectal diazepam (5–10 mg) or IM/buccal midazolam (10 mg) are effective alternatives if there is no venous access.[5] Drugs such as phenytoin or sodium valproate may be loaded at this stage to prevent recurrence, it is important to check the patient's current drug history as loading is contraindicated in patients already taking these medications. Admission to intensive care is frequently mandated due to ongoing need for sedation and airway management.

Long-term management of epilepsy aims to prevent further seizures using the fewest possible medications, ideally monotherapy to reduce the possible number of interactions and potential side effects.

Perioperative issues

Epileptic patients have been shown to suffer higher rates of perioperative morbidity and increased length of stay, particularly those with poorly controlled disease requiring frequent unscheduled hospitalization.[7]

Chronic drug therapy: preoperative assessment should ascertain adequacy of seizure control and current medication. Poorly controlled epileptics are at high risk of postoperative seizure so are better recovered in high-dependency environments. Medications should be taken in their usual doses and recommenced promptly. Where one dose has been missed, this should be taken as soon as possible postoperatively. Where more than one dose is missed or where oral administration is impossible (e.g. unable to swallow, vomiting) alternatives must be considered. Modified-release preparations are unsuitable for crushing in order to be dispensed down a nasogastric tube and some medications do not have an intravenous alternative; these cases are best discussed with a neurologist and problems anticipated early so the correct formulation is available. Phenytoin is a commonly used parenteral therapy; ECG monitoring is required for its institution as it may induce arrhythmias. Pharmacist advice is invaluable.

Drug interactions and side effects: antiepileptic drugs, particularly the older generations, are notorious for drug interactions usually through induction or inhibition of the CYP450 system of enzymes in the liver. When prescribing it is vital to consider whether the new drug will have any effect on the metabolism of concurrently prescribed medication or an effect on seizure threshold. Table 1 details drugs commonly prescribed in the perioperative period and their relevance to epilepsy.

Parkinson's disease

'Parkinsonism' describes the clinical features of bradykinesia, rigidity and resting tremor; in 85% of cases this is caused by 'Parkinson's disease' characterized by a loss of dopaminergic neurons in the substantia nigra of the basal ganglia. It is primarily a disease of the elderly.

Although early clinical manifestations relate to movement, Parkinson's disease and its treatment have multi-system effects and non-motor symptoms such as orthostatic hypotension, fatigue and depression become increasingly apparent with progression. Obstructive respiratory function is common.

The mainstay of treatment is increasing the central availability of dopamine using L-DOPA (provides exogenous dopamine). Other agents include:

- dopamine agonists (e.g. pramipexole)
- monoamine oxidase inhibitors type B (e.g. selegiline), which reduce dopamine breakdown
- catechol-O-methyl transferase (COMT) inhibitors (e.g. entacapone), which reduce the breakdown of dopamine and are used to reduce L-DOPA dose thereby reducing 'peak dose' chorea whilst smoothing out 'off' periods.

Nausea and vomiting are common dopaminergic side effects, as is hypotension, often compounded by the dysautonomia caused by the disease itself.

Perioperative issues

Medicines management: medical management of Parkinson's disease often involves a highly personalized schedule of medications, which often do not fall in with routine administration times leaving patients vulnerable to disruption and consequent morbidity whilst hospitalized. Poor symptom control can compromise postoperative recovery and the surgical patient is particularly at risk due to unavoidable interruption of regime and barriers to recommencement of normal medications such as vomiting, altered gut function or decompensation of swallow secondary to medication cessation.

Regional anaesthesia may be advantageous as patients can recommence medications sooner postoperatively. However, these techniques are suitable only for certain types of surgery and may be technically challenging or dangerous in the face of poorly controlled tremor or dyskinesia.

