Commentary

A practical approach to the acute management of patients with likely cerebral ischemia

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In a related article, Perry and colleagues discuss the management of patients with transient ischemic attack (TIA) or minor stroke.[1] Experts estimate that 41 000 people experience such events annually in Canada (Jessalyn Holodinsky, University of Calgary: personal communication, 2022). Symptomatic cerebral ischemia occurs on a spectrum, from mild and transient to severe and fatal. By definition, TIA is the mildest form of symptomatic cerebral ischemia, typically lasting 15 minutes or less,[2] but is formally defined by the full resolution of all neurologic symptoms and signs within 24 hours. However, many patients labelled as having had a TIA have actually had a minor stroke, as they either have persisting minor neurologic symptoms and signs that have been missed, or their symptoms have resolved but brain imaging still shows evidence of ongoing ischemia.[3,4] Therefore, it is not clinically useful to distinguish between TIA and minor stroke. Best practice is to investigate quickly and intervene rapidly to prevent disabling ischemic stroke, which requires the use of simple risk stratification combined with timely neurovascular imaging.

Minor cerebral ischemic events are associated with a higher risk of a future more serious illness. A 2007 study found that, before the era of urgent treatment, patients with TIA or minor stroke had an estimated risk of recurrent ischemic stroke in the next 90 days of 17%.[5] However, urgent assessment and treatment of TIA or minor stroke can reduce this risk to 2%–3%.[6,7] It is critical to understand that brain ischemia is a time-sensitive diagnosis that warrants time-sensitive action. As in the assessment of chest pain, clinical symptoms alone cannot be used to make a diagnosis; electrocardiography (ECG) and serum troponin are used in conjunction with clinical symptoms to make the diagnosis and guide management. Similarly, clinical symptoms and urgent brain and neurovascular imaging are all needed to accurately assess TIA and minor stroke.[8]

A TIA or minor stroke is initially a working diagnosis. Clinicians should identify if the patient has had motor or speech symptoms. If so, they are at higher risk of progressive or early recurrent stroke over the ensuing 90 days; if not, they are lower risk. We respectfully disagree with Perry and colleagues that it is acceptable to defer neurovascular imaging to the outpatient setting.[1] High-risk patients should be sent for brain and neurovascular imaging immediately, as half of recurrent stroke events occur within the first 48 hours, many overnight during sleep.[9] Extracranial carotid, vertebral artery or intracranial atherosclerosis are major causes of early recurrence, and there are clear, effective treatments.

Key points

- Many patients labelled as having had a transient ischemic attack (TIA) may actually have had a minor stroke.
- Best practice is to investigate quickly and intervene rapidly to prevent a further disabling event; this requires simple risk stratification and timely neurovascular imaging.
- Although magnetic resonance imaging need not be done urgently because clinical risk stratification and neurovascular imaging adequately identifies patients at the highest risk, it should be organized within a week.
- A careful stepwise approach to the acute management of TIA and minor stroke can optimize outcomes for patients.

Computed tomography (CT) or magnetic resonance angiography (MRA) of the cerebral arteries (from arch to vertex) should be ordered, as normal scans have very high negative predictive value for early recurrence, meaning that one can safely send a patient home, typically on antiplatelet therapy with planned follow-up as an outpatient.[10] Carotid duplex Doppler ultrasonography is useful for investigating the carotid artery but not the posterior or the intracranial circulation, which limits its comprehensiveness as a diagnostic tool. Patients with substantial abnormalities on computed tomography angiography (CTA) (e.g., vessel occlusion, stenosis > 50%) should be admitted, and patients with normal imaging can be discharged on treatment, to be seen urgently in clinic. Clinical scores (e.g., ABCD2 [age, blood pressure, clinical features, duration of symptoms and diabetes] score) have not been proven useful in clinical practice because they do not have adequate discriminative value.[11] Rather than a score, we use recent events and motor or speech symptoms (e.g., aphasia or dysarthria) to triage which patients should have an urgent CTA before clinic.

Although neurovascular imaging helps to stratify early risk, magnetic resonance imaging (MRI) is essential for making the correct diagnosis. In a multicentre cohort of 1028 patients with low-risk transient focal neurologic events (i.e., no motor or speech symptoms or signs), we found that 13.5% showed evidence of ischemia

on MRI.[12] Since a TIA or minor stroke may involve only a very small volume of tissue, a lesion may not be seen on CT. Thus, a "negative" CT scan of the brain alone does not rule out an ischemic diagnosis and should not be interpreted as reassuring or implying a low-risk state. Although MRI need not be done urgently because clinical risk stratification and neurovascular imaging adequately identify patients at the highest risk, it should be organized within a week. A simple 10-minute fast stroke protocol for MRI of the head (using axial diffusion-weighted imaging, axial fluid-attenuated inversion recovery, axial gradient echo or susceptibility-weighted sequences) is clinically adequate. Like CTA, a normal MRI is extremely helpful since it has both a high negative predictive value for future stroke risk and increases the post-test probability that the diagnosis is a stroke mimic (e.g., migraine). Hesitance in pursuing imaging that definitively aids management is simply not justified; both MRI and CT are now widely available across Canada.

We take the following stepwise approach to the acute management of TIA and minor stroke. First, we seek to make the diagnosis. By the time the physician reviews a patient with persisting neurologic signs on examination, that patient has suffered a stroke. The distinction between TIA and minor ischemic stroke is not pragmatically meaningful. We stratify risk clinically, considering patients who have had motor or speech (e.g., aphasia or dysarthria) symptoms to be high risk for recurrent events, and everyone else to be low risk. We then order noncontrast CT imaging of the brain to rule out important but uncommon mimics, such as subdural hematoma or a brain tumour. Imaging the arteries is next. Typically, we conduct a CTA, arch to vertex, in the same imaging session as the brain CT. If the CTA is completely normal (i.e., no occlusion, no atherosclerosis or arterial dissection and no other vascular abnormality), we rely on the high negative predictive value of this result and discharge the patient home on antiplatelet treatment with outpatient follow-up, including MRI of the brain (since CT cannot reliably rule out minor ischemia) within the first week. Normal arterial imaging generally means that further investigations, including echocardiography, can be done in an outpatient setting; in the absence of other cardiac history, the prevalence of other cardioembolic sources (e.g., left ventricular thrombus, valve disease) is low. We admit patients with symptomatic occlusions or severe stenoses to hospital. Those with ipsilateral severe carotid stenosis require revascularization with endarterectomy or stenting urgently, within the next several days. We examine the patient's electrocardiogram (ECG), since a first diagnosis of atrial fibrillation was shown to occur at the time of a brain ischemic event in 28.6% of a large Alberta cohort.[13] If atrial fibrillation is shown on an ECG, and a brain CT shows no hemorrhage, we consider it safe to begin an oral anticoagulant immediately because the volume of brain ischemia is very small. Holter monitoring is not needed if the ECG clearly shows atrial fibrillation.

Given the high burden of TIA or minor stroke events seen annually in Canada, not enough experts in stroke neurology are available to provide urgent care to all affected patients. Generalist and emergency physicians should be aware that best practice is to investigate quickly and intervene rapidly to prevent disabling ischemic stroke, which requires the use of simple risk stratification combined with timely neurovascular imaging.

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