

Answers to Frequently Asked Questions about Stroke Evaluation and Treatment

Do you prefer the term “stroke” or “CVA?”

The term CVA seems more appropriate for a motor vehicle accident than a life threatening occurrence. In fact, such ischemic events are rarely accidents since many have been in the offing for some time. Standard risk factors are well documented and can be noted long before any specific event. The term “stroke” is a nice inclusive term which denotes that the specific diagnostic subcategory has yet to be delineated. These subcategories include hemorrhagic, embolic, thrombotic, and lacunar strokes.

Will you comment further on these four subcategories of stroke?

1. **Hemorrhagic strokes** are usually due to hypertensions, vascular malformation, and ruptured aneurysms. When trauma is the etiology for intracranial hemorrhage, this is not by definition a stroke, but alternatively a stroke in a particular area of the brain may cause loss of motor function and resultant trauma.
2. **Embolic strokes** arise from clots on heart valves, akinetic heart chambers, and conceivably from one artery to another, such as a consequence of carotid artery disease.
3. **Thrombotic strokes** are due to multiple factors that alter coagulation. These patients often awaken from sleep with symptoms and signs of stroke.
4. **Lacunar strokes** usually produce a more limited syndrome, presenting as pure motor or sensory loss, or ataxia. By definition a lacunar stroke involves a small volume of brain tissue, usually less than one square centimeter.

What are some of the standard clinical patterns that alert us to the probability that a patient has had a stroke?

1. Left internal carotid artery strokes typically cause some form of a right hemibody syndrome, with either motor or sensory deficits. In most right-handed and almost all left-handed people, this will involve some element of speech.
2. Right internal carotid artery strokes typically involve a left hemibody syndrome, with either motor or sensory deficits. These patients may also have evidence of neglect or dysarthria.
3. Posterior circulation strokes typically involve multiple cranial nerves and any limb may suffer either sensory or motor impairment.
4. Lacunar strokes are frequently either motor or sensory, typically not both, and may be mild in severity.

Where and why do intracranial hemorrhages occur?

1. Intraparenchymal strokes are often due to hypertension.
2. Subdural and epidural strokes are usually caused by trauma.
3. Subarachnoid strokes are most commonly due to ruptured aneurysms or vascular malformations, but sometimes due to trauma.

What are some conditions that mimic strokes?

1. Migraine headache
2. Ménière’s disease (which is frequently overdiagnosed)
3. Toxic metabolic diffuse insult states (usually underdiagnosed)
4. Side effects of medications (which increase with patient age and number of medications taken)

5. An old stroke with a new systemic insult may masquerade as a new neurologic deficit
6. Focal infection
7. Todd's paralysis (hemiparesis seen in the wake of an epileptic convulsion)

Beside brain imaging, what other tests may be appropriate?

1. Carotid artery imaging by Doppler study, magnetic resonance angiography, computerized tomographic angiography or conventional angiography
2. Transthoracic or transesophageal echocardiogram to evaluate heart chambers and valves and to rule out patent foramen ovale
3. Electrocardiogram, blood count, complete metabolic panel, lipid panel and coagulation studies
4. Homocysteine levels and screening for hypercoagulable states may be indicated by personal or family history or onset of stroke before age 50

If no hemorrhage is seen on CT head scan or MRI, what immediate anticoagulant therapy should be considered?

For appropriate patients seen within three hours of the stroke onset, r-TPA is recommended. Streptokinase is used only under certain approved protocols at the present time, and it is not for general use. Lovenox is used subcutaneously for deep vein prophylaxis. Otherwise heparin should not usually be used in the acute stroke setting.

When should heparin be used in acute strokes?

The American Academy of Neurology and the American Stroke Association criteria, in a major educational push on their parts, currently state that there are no grounds for acute IV heparin use.¹ However, subcutaneous heparin use for deep vein thrombosis is another matter. Some leading neurologists in this country nonetheless would argue that there are some indications for heparin use, namely:

1. Stroke in evolution
2. High grade carotid artery stenosis as a stopgap prior to surgery
3. A posterior circulation event in the brain
4. Atrial fibrillation or a heart source suspicious for embolism

When should I use r-TPA?

There are very strict inclusion criteria, the most important being within the crucial three hour window from onset of symptoms to actual infusion.

What are common exclusions for r-TPA?

It should not be used if the physician suspects anything other than a stroke. It should not be used later than three hours after onset of symptoms, or when the patient is already improving without it.

What about arterial r-TPA?

This shows promise but is not ready for widespread use. It is under study in several centers but is not considered the standard of care.

What are typical indications for warfarin?

1. Cardioembolic stroke
2. Recurrent non-cardioembolic stroke
3. Failing antiplatelet medication, particularly when a potential embolic course is known or there is an embolic infarct pattern displayed on CT scan or MRI of the brain
4. Some hypercoagulable states
5. Some cases of carotid or vertebral artery dissection
6. Symptomatic intracranial arterial stenosis
7. Patients who experience a transient ischemic attack while taking an antiplatelet agent
8. Patients with "crescendo" transient ischemic attacks
9. Extracranial cervical artery dissection
10. Severe carotid stenosis before endarterectomy
11. Patients who are poor candidates for carotid endarterectomy
12. Antiphospholipid syndrome, cerebral venous thrombosis, and systemic lupus erythematosus involving the central nervous system

What is the MERCI device?

The MERCI device is a retrieval instrument inserted through a peripheral artery to pull blood clots out of the brain in a corkscrew fashion. It is the first medical device approved by the FDA to physically remove blood clots from a stroke patient's brain. The device cannot be used more than eight hours after the onset of stroke symptoms.

What role does carotid stenting have in acute stroke management?

A large French study compared carotid stents to carotid endarterectomy.² The study was stopped for safety considerations. The stents were more dangerous

than traditional surgery. Possible indications for carotid stenting include:

1. Restenosis after surgery
2. Patients with medical contraindications to endarterectomy or any other surgery
3. Patients with extensive scarring due to prior neck radiation or surgery
4. Elderly patients with serious comorbidities

How does one choose between aspirin, dipyridamole, and clopidogrel?

1. Aspirin is indicated as secondary stroke prevention after an ischemic stroke.
2. Clopidogrel (75 mg/day) is used when aspirin fails. It is not to be used with aspirin.
3. Aggrenox™ contains dipyridamole 200 mg plus aspirin 50 mg. In some patients this may work better than aspirin alone.

When are statins used in stroke prevention?

According to a study published in 2006, statins are useful for secondary prevention, even in patients without high cholesterol levels, unless otherwise contraindicated.³

When should a vascular surgeon be consulted in acute stroke management?

A vascular surgeon should be called if carotid artery stenosis is 70–99%. In such cases a surgeon would likely perform a carotid endarterectomy in the absence of medical contraindications. Consultation is appropriate in 50–69%, particularly when there is recent transient ischemic attack or minor stroke where endarterectomy may be a therapeutic option. Vascular surgeons should also be consulted for significant arterial wall ulceration, and in recurrent strokes or transient ischemic attacks in the same distribution as a previous endarterectomy.

When should an intensivist be consulted in acute stroke management?

1. When r-TPA is administered
2. When there is evidence of impending cerebral herniation
3. When there is a large hemorrhage, particularly with decreased levels of consciousness or concern about re-bleeding
4. When patients have carotid artery dissection, subarachnoid hemorrhage or subdural hematoma

When can a patient with transient ischemic attack be sent home from the Emergency Department?

Unfortunately the highest risk of stroke after a transient ischemic attack is in the first 48 hours. There are two common circumstances when such a patient can be discharged before 48 hours of observation:

1. If an extensive workup has been completed in the last few weeks and the patient is currently quite stable, after an extended discussion with the patient and family and careful documentation, early discharge may be considered.
2. If the patient or family refuse any further evaluation or treatment and this is discussed and thoroughly documented.

How do I keep my patients from having a first stroke?

Address all correctable risk factors:

1. Smoking
2. Hypertension
3. Diabetes mellitus
4. Hyperlipidemia
5. Atrial fibrillation
6. Carotid artery stenosis
7. Obesity and sedentary lifestyle
8. Personal stress may or may not be a risk factor
9. Information on alcohol is somewhat controversial. Low dose consumption may be helpful but more than two alcoholic beverages per day potentially increases the risk of stroke.

What are some less common risk factors for stroke?

1. Patent foramen ovale is a controversial risk factor since 20% of the population has this anatomic variant. During transesophageal echocardiography, microbubbles are injected into the heart circulation. If three or more bubbles are seen during three cardiac cycles with or without provocation, some experts suggest that closure of the patent foramen ovale may prevent strokes. Other experts claim that an atrial septal aneurysm with greater than 11 mm displacement of the wall into either atrium warrants closure. If both patent foramen ovale and atrial septal aneurysm are present, the risk of stroke is definitely higher than in the general population. Antiplatelet therapy may be considered, but surgery is reasonable if this fails.

2. Homocysteine levels 10 times normal may warrant administration of multivitamins with 0.4 mg folic acid. This will lower homocysteine blood levels. However there is still no convincing evidence that this will lower the risk of strokes.
3. When unexplained strokes or transient ischemic attacks occur in the presence of antiphospholipid antibodies, antiplatelet agents are reasonable interventions. In antiphospholipid antibody syndrome with venous or arterial occlusive disease in multiple organs, livedo reticularis, or recurrent miscarriages, warfarin therapy with a target INR of 2 to 3 international units is appropriate.

How do I prevent a second stroke?

1. We must address the same concerns as in primary strokes, focusing on the same modifiable risk factors.
2. In embolic strokes, particularly with atrial fibrillation, consider using warfarin.
3. In embolic strokes with carotid artery stenosis, consider surgery.
4. In hemorrhagic strokes, address hypertension, bleeding diatheses and think of possible vascular malformations.
5. In ischemic thrombotic strokes, consider aspirin, aspirin plus dipyridamole or even clopidogrel.

What are some long-term concerns when caring for patients after a stroke?

1. Impaired swallowing and deep vein thrombosis are common
2. Pain may become an ongoing complaint
3. Neglect may significantly affect rehabilitation
4. Many stroke patients eventually die of myocardial infarction

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References

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