

infoaging guides

DISEASES OF AGING



STROKE

An introduction to aging science brought to you by the
American Federation for Aging Research

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WHAT IS A STROKE AND WHAT ARE ITS WARNING SIGNS

Strokes, sometimes referred to as “brain attacks,” occur when the circulation to a portion of the brain is disrupted. The brain cells that should be supplied with oxygen and nutrients by the disrupted blood supply could be damaged or die. Strokes are the third leading cause of death in the United States and the leading cause of disability in adults. Each year, about 500,000 Americans suffer new strokes, and another 200,000 suffer a recurrent stroke. Thirty percent of these will die within the year, and another 30 percent will be unable to live independently. More than half of those who survive their strokes will die within eight years.

The two major categories of stroke are ischemic stroke (85 percent), in which the blood supply to one of the arteries of the brain is cut off, and hemorrhagic stroke (15 percent), in which a blood vessel bursts. The two types of stroke have different causes and somewhat different symptoms. A warning of a potential ischemic stroke is a transient ischemic attack (TIA), which has some of the symptoms of a stroke, but usually resolves in 24 hours or less. According to the American Stroke Association, 74 percent of Americans do not know all the warning signs of stroke.

Signs and symptoms of the different kinds of stroke vary.

Transient ischemic attack

Symptoms of TIA:

- Are abrupt in onset
- Typically last from two minutes to two hours (although may persist for up to 24 hours)



Each year, about 500,000 Americans suffer new strokes, and another 200,000 suffer a recurrent stroke. Strokes are sometimes referred to as “brain attacks.”

- Can include: blindness in one eye, loss of balance, weakness on one side of the body, tingling sensations on one side of the body, speech difficulties, confusion, or double vision.
- Consciousness is usually normal.

Ischemic stroke

Symptoms of an ischemic stroke often include a sudden weakness of the face, arm and leg,

sometimes with loss of sensation. Loss or impairment of speech, or the inability to understand others can also occur. Strokes that affect the vessels in the back of the brain can produce visual problems (including blindness), and uncommonly can produce weakness in all four limbs. Strokes may also cause sudden trouble walking, dizziness, or loss of balance or coordination. A sudden

severe headache with no known cause may also be present.

Symptoms of weakness may occur abruptly, and peak within a few minutes. It is important to recognize, however, that strokes may have fluctuating symptoms at onset.

In the first two to three days following a stroke, consciousness can be affected due to brain swelling, which can be fatal.

Which parts of the body are affected depends on the artery involved. Most typically, a stroke in arteries on one side of the brain will produce symptoms on the other side of the body.

Hemorrhagic stroke

Symptoms are abrupt in onset and usually follow a headache. Increasing neurological symptoms, such as weakness, eyes looking off to one side, and coma can be seen. Nausea, vomiting, delirium and seizures can follow. More than 50 percent of those who suffer large hemorrhagic strokes die within a few days. In those who survive, symptoms can gradually abate, although disability may be permanent.

DIAGNOSING STROKE

How does a doctor diagnose a stroke?

The diagnosis of the different types of stroke is made based on numerous factors and tests. The different types of stroke are:

Transient ischemic attacks (TIAs)

A thorough history and physical examination to rule out seizures, migraines, tumors, and Meniere's disease (a form of vertigo) are necessary. Ultrasound of the carotid arteries (the main blood vessels that travel up the neck and supply the brain with blood) can confirm

the presence of vessel narrowing and presence of arterial plaque. An echocardiogram can be performed to look for the presence of blood clots within the heart itself, which can be the source for small emboli (clots that travel to clog blood vessels) in the brain that can cause TIAs or later strokes.

Ischemic stroke

In a person over the age of 50 with risk factors (e.g., diabetes, high blood pressure, known hardening of the arteries, atrial fibrillation or some other heart disease), the diagnosis of a stroke can be made on the basis of the history and physical examination. Blood tests should be done to look for less common causes of a stroke, such as polycythemia (an excess of red blood cells). A chest X-ray and an electrocardiogram are often helpful. A CT scan or MRI of the brain differentiates between an ischemic stroke and a hemorrhagic one. A CT can be negative for a day or more in an ischemic stroke; an MRI can show abnormalities within a few hours. Blood vessel imaging using CT or MR (CTA or MRA), or conventional angiography, is often performed. Studies of the

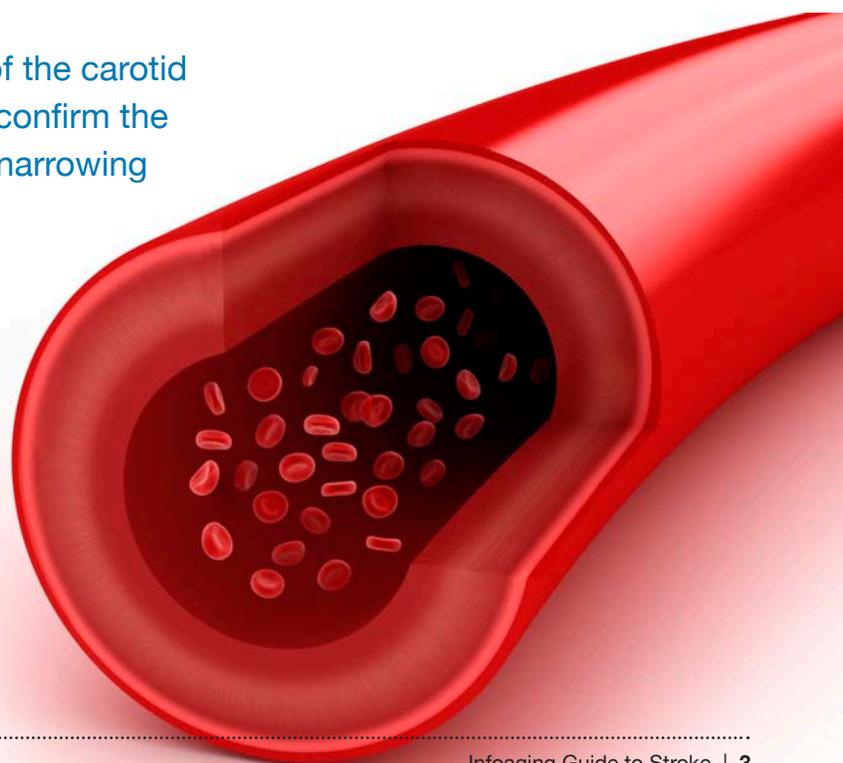
circulation may pinpoint the source of the stroke.

Recent research shows that those at highest risk of stroke due to narrowing of the blood vessels also have blood vessel narrowing in other parts of the body. The blood vessels in the eye can often demonstrate abnormalities known to be associated with high blood pressure or diabetes. Scientists in Boston conducted a study of more than 10,000 people, photographing the vessels in their retinas. Those with certain forms of narrowing of those retinal blood vessels were found to have a risk of stroke 2 1/2 times higher than those whose eye vessels were normal. This technique, however, needs further study.

Hemorrhagic stroke

The history and physical examination are often quite similar to that for ischemic stroke. CT scans and MRIs will show the presence of blood in the brain. Sometimes, spinal taps are performed, looking for blood in the cerebrospinal fluid.

Ultrasound of the carotid arteries can confirm the presence of narrowing and plaque.



RISK FACTORS FOR STROKE

What are the risk factors for stroke?

The major risk factors for stroke include:

- High blood pressure
- Cigarette smoking
- Diabetes
- High cholesterol and triglycerides
- Atrial fibrillation (a type of abnormal heartbeat)
- Sleep apnea
- Polycythemia (an excess of red blood cells)
- Prior stroke or transient ischemic attacks (TIAs)
- History of coronary artery disease and atherosclerosis
- Age
- Heredity and race

In addition, excessive alcohol use, and types of drug abuse (e.g., intravenous drug use and cocaine use) are also associated with a greater risk for stroke. Other risk factors include poor nutrition, obesity, and physical inactivity. As with several other diseases, lower income and education levels have been associated with stroke risk.

High blood pressure

High blood pressure — (140/90 mm Hg or higher) — is the most important risk factor for stroke. In general, stroke risk is directly associated with high blood pressure. The higher your blood pressure, the higher your risk of stroke. Effective treatment of high blood pressure or hypertension is critical because the risk of stroke decreases as blood pressure decreases.

Cigarette smoking

Research has demonstrated a powerful association between cigarette smoking and an increased risk for stroke. The use of oral contraceptives along with cigarette smoking is particularly dangerous. But more than 1.7 million Americans quit smoking every year, and you can too! The National Cancer Institute, the American Cancer Society, Nicotine Anonymous, and many other groups can provide you with everything from proven strategies for how to quit smoking — to telephone, online, or local counseling to give you cessation support. Learn more about how to quit and quit for keeps!



Diabetes

Several aspects of diabetes contribute to a risk for stroke. An independent risk factor for stroke, diabetes is also strongly associated with high blood pressure, high cholesterol, and obesity—all of which can increase heart disease risk and hence, stroke risk. In sum, diabetes increases the risk of stroke three-fold. As with other health care problems, however, treatment can control diabetes and delay the complications that increase the chance of stroke.

High cholesterol and triglycerides

A study of more than 11,000 people conducted by Israeli researchers demonstrated that high levels of triglycerides, one of the lipids or fats that circulates in the blood, increase the risk of stroke or transient ischemic attacks. The same study found that higher levels of HDL, the so-called “good” cholesterol, were associated with a lowered risk of stroke. Among the strategies to reducing cholesterol and triglycerides are a class of drugs called statins, which can help to reduce the risk of stroke, heart attacks, and death.

Atrial fibrillation

According to the American Stroke Association, “People with heart problems have twice the risk of stroke as those with hearts that work normally. Atrial fibrillation (the rapid, uncoordinated beating of the heart’s upper chambers), in particular, raises the risk of stroke. Heart attack is also the major cause of death among survivors of stroke.” The prevalence of atrial fibrillation increases markedly with age in older adults, from less than 1 percent for those younger than age 60, to roughly one in every 10 persons aged 80 years or older. An estimated 2.2 million adults in the United States have been diagnosed with atrial fibrillation, which accounts for one-fourth of all strokes in the elderly. Medications that reduce the risk of blood clot formation, such as aspirin and warfarin (Coumadin®), help reduce stroke risk in persons with atrial fibrillation. Additionally, anti-arrhythmia medications can help regulate the heart rhythm. In some cases, atrial fibrillation can be cured by catheter ablation, according to an article in the November 12, 2003 issue of the American Heart Association journal *Circulation*.

Sleep apnea

Sleep apnea is one of the sleep-related breathing disorders. Persons who suffer from sleep apnea suffer from short periods of not breathing while they sleep. They are often heavy snorers. Some of its causes are obesity, deviated nasal septum, enlarged tongue, excess soft palate tissue, and paralyzed vocal cords. The health consequences of sleep apnea are many, and include heart problems. Recent studies have shown that sleep apnea increases the risk of stroke independent of other risks like high blood pressure. Sleep apnea is treatable; more studies must be done to show whether treatment of the sleep disorder reduces the risk of stroke.

Polycythemia (an excess of red blood cells)

The more red blood cells in circulation, the thicker the blood and the greater the chance for clots. When there is a significant excess of red blood cells, stroke risk may be elevated.

Prior stroke or transient ischemic attacks (TIAs)

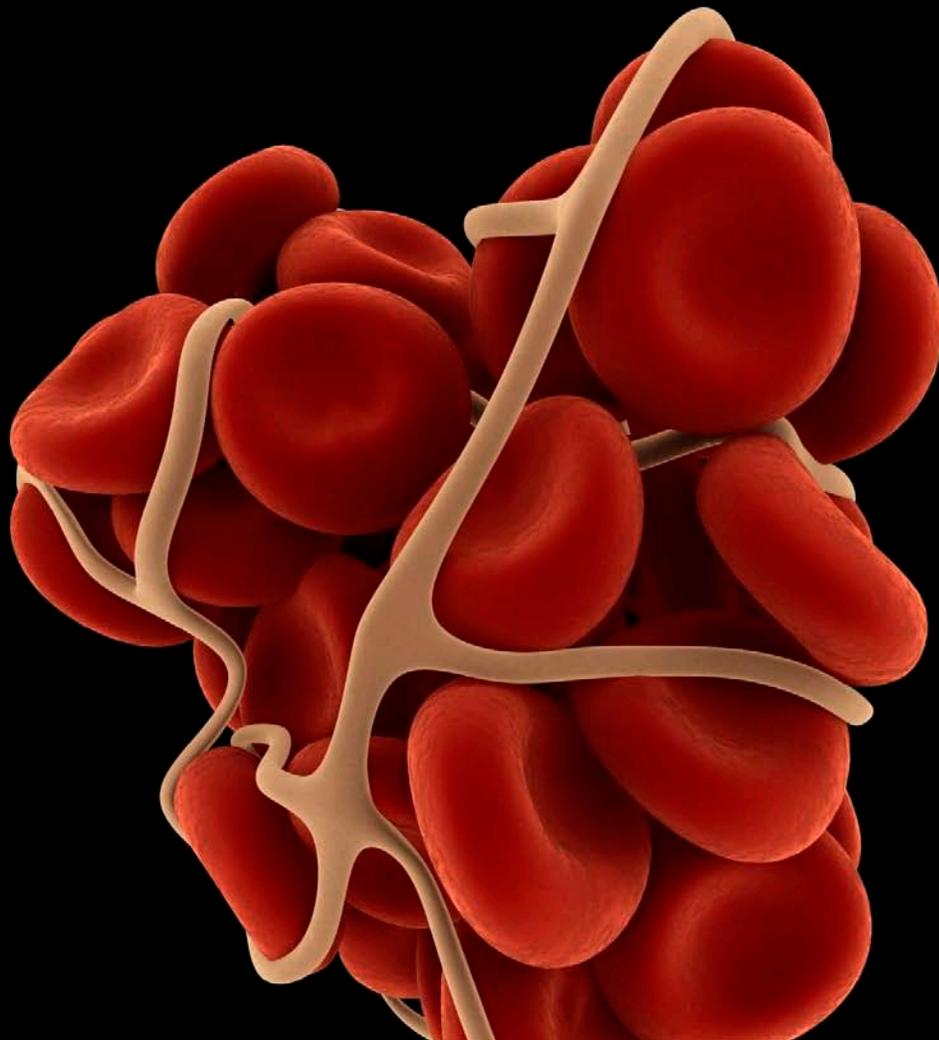
If you have had a stroke, you are much more likely to have a second stroke. TIAs are “warning strokes,” which produce symptoms similar to a stroke, but no permanent disability. If you have had a TIA, your risk of a full stroke is increased. Indeed, one-third of all persons with TIAs suffer a stroke within five years. It is very important to recognize the warning

signs of a stroke or a TIA and to call 9-1-1 for immediate medical help.

History of coronary artery disease and atherosclerosis

According to the American Heart Association, atherosclerosis is a major cause of cardiovascular disease in this country. Atherosclerosis (arteriosclerosis) involves deposits of cholesterol, calcium, and other substances in the inner lining of an artery. This plaque can cause coronary artery disease, clogging the arteries supplying blood to the heart, and causing a heart attack. It can also clog the carotid artery supplying blood to the brain, which in turn may cause a stroke. Atherosclerosis, however, can be managed. Your doctor can prescribe medication to help prevent the formation of clots. If you are over 50, scientists from the National Institute of Neurological

The more red blood cells in circulation, the thicker the blood and the greater the chance for clots.



Disorders and Stroke suggest that you speak with your physician about the possibility of aspirin therapy.

Age

The incidence of stroke is age-related. In each decade after you reach 55, your risk of stroke doubles. While stroke is much more common in older people, younger people also are victims.

Heredity and race

A family history of stroke is associated with a greater risk of stroke. In part because of a much higher incidence of high blood pressure and diabetes, African Americans have a significantly higher risk of death and disability from strokes than whites. Individuals who live in the

African Americans have a significantly higher risk of death and disability from strokes than whites.

“Stroke Belt” region of the United States also tend to have a higher risk of stroke than individuals living in other parts of the country, according to the National Heart, Lung, and Blood Institute (NHLBI). The “Stroke Belt” states include Alabama, Arkansas, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee. In addition, a new study, called Brain Attack Surveillance in Corpus Christi (BASIC), published in the August 15, 2004 issue of the *American Journal of Epidemiology*, points out that Hispanic Americans are at high risk of stroke. The NHLBI and the U.S. Department of Health and Human Services have been funding research initiatives to study these variations in stroke

incidence in different population subgroups.

TREATMENTS AVAILABLE FOR STROKE

What treatments are available for strokes?

Treatment varies with the type of stroke diagnosed.

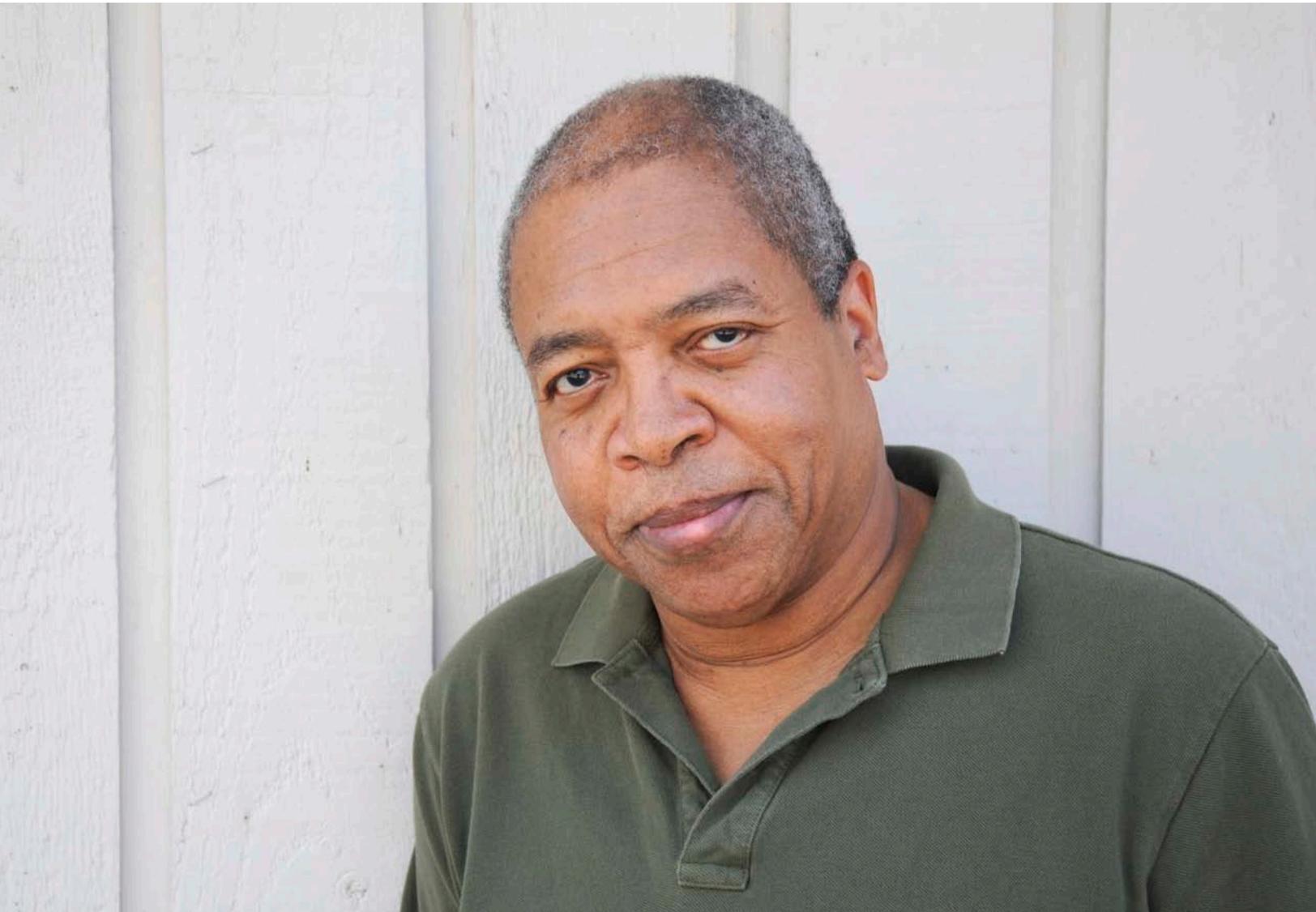
- Transient ischemic attacks
- Ischemic stroke
- Hemorrhagic stroke

Transient ischemic attacks

The American Heart Association’s treatment recommendations for TIAs include the following:

Antiplatelet agents

These drugs act to reduce the “stickiness” of platelets, small



blood cells that promote blood clotting. The most common antiplatelet drugs currently in use include aspirin, dipyridamole (Aggrenox) and clopidogrel (Plavix). The new guidelines suggest that aspirin alone, aspirin combined with long acting dipyridamole, or clopidogrel alone are all acceptable forms of initial therapy after a TIA or stroke. Although clopidogrel is a good drug substitute for individuals who are allergic to aspirin, *the two medications should not be used together*. In combination, they may increase the risk of internal bleeding.

Anticoagulants

These are sometimes called “blood thinners,” but they actually work by interfering with the proteins that allow blood to clot. The most familiar of these medications is warfarin (Coumadin). Warfarin is superior to aspirin for those patients who have had TIAs, especially if they also have a heart rhythm irregularity called atrial fibrillation. However, Warfarin can cause patients to bleed easily, and they must often restrict their diets to prevent certain drug side effects, as well as undergo constant medical monitoring. These issues can discourage physicians from prescribing the drug, so finding an alternative has long been a focus of pharmaceutical research. In October 2010, the FDA finally approved one such alternative, an oral medication called dabigatran. Dabigatran belongs to a class of anticoagulants called direct thrombin inhibitors (DTIs), which slow down blood clotting by blocking the expression of an enzyme called thrombin. Studies show that dabigatran is as effective as warfarin at preventing strokes and causes less

bleeding (depending upon dosage). The only patient-reported side effect is mild stomach upset, and medical monitoring has proven unnecessary. However, cost may be an issue, as the drug is more expensive than its older counterpart, and there is a slight but statistically significant increase in heart attacks among patients who use it.

Surgical interventions

Carotid endarterectomy (CEA) is the surgical removal of plaque build-up that is constricting blood flow to the brain through the common carotid artery, the main vessel in the neck. This surgery is most frequently used to prevent a second stroke after an initial TIA or full-blown stroke — although it can sometimes help prevent strokes before any have occurred. Recent studies show that CEA is beneficial for patients whose arteries have narrowed by 50 percent or more and are experiencing related symptoms. This surgery may be somewhat less beneficial for older women, although the question remains controversial.

Carotid angioplasty and stenting (CAS)

(CAS) has emerged as an effective, less invasive alternative to CEA for some patients. Stents are tubes of mesh that are inserted into narrowing arteries to keep them open. CAS may be useful for symptomatic patients whose arterial duct has narrowed by more than 70 percent, especially if their plaque build-up is difficult to reach surgically, they have medical conditions that make surgery risky, their arteries have re-narrowed after a previous CEA, or their arterial narrowing is due to scarring from previous radiation therapy.

Ischemic stroke

Care for ischemic stroke often takes place in the emergency department and includes protecting the airway, monitoring heart function, administering intravenous fluids, treating seizures if they occur, and treating excessively high blood pressure. Thrombolytics therapy (“clot busters”) may also be prescribed.

Thrombolytic therapy

Thrombolytic therapy refers to the intravenous administration of enzymes that dissolve clots and allow the circulation of blood to resume. The American Heart Association (AHA)/American Stroke Association (ASA) recommends the use of a thrombolytic drug called tissue plasminogen activator (t-PA) to treat acute ischemic stroke in the 3- to 4.5-hour time window after symptom onset. However, the drug can’t be used if the patient is currently taking an anticoagulant such as Warfarin. While the elderly may have a higher risk of bleeding from t-PA, they are still better off with t-PA than without.

Some studies have shown benefit with using thrombolytic agents directly at the site of the blockage. By threading a catheter through the affected artery and injecting the medication at the clot, doctors have been able to give some patients a better neurological outcome. Thrombolytic therapy does carry about a 6.4 percent average risk of inducing bleeding in the brain, which can worsen the stroke symptoms and outcome. On some occasions, a clot busting agent can be given through a catheter that is threaded up to the clot in the brain. For local intra-arterial thrombolysis, in the PROACT II trial, there was an approximate 10 percent risk of

bleeding. The American College of Chest Physicians Evidence-based Clinical Practice Guidelines (8th edition) gives this practice a weak recommendation because of low-quality evidence to date, and only for patients with blockages in particular blood vessels in the brain and within a six-hour window of symptom onset.

Hemorrhagic stroke

Initial treatment for hemorrhagic stroke tries to control bleeding in the brain and reduce swelling. If you take anti-clotting medications such as warfarin (Coumadin) or clopidogrel (Plavix), you may receive medications or transfusions of blood products to counteract their effects and otherwise reduce your brain's response to bleeding. Here are some other types of medication you may receive:

- Drugs to lower blood pressure
- Mild sedatives, as increased intracranial pressure from the blood in the brain can cause restlessness
- Narcotics to relieve headache
- Stool softeners to minimize straining, which can raise intracranial pressure

- Anti-nausea medications, as increases in intracranial pressure can cause vomiting
- Anti-convulsants to prevent seizures

Once the source of bleeding is identified, doctors may recommend surgery to remove blood from on the brain (and thereby relieve intracranial pressure), prevent future hemorrhages, or repair blood vessel abnormalities associated with hemorrhagic strokes.

After the bleeding stops, patients receive bed rest and supportive medical care.

One particular type of stroke, called subarachnoid hemorrhage (SAH), results from bleeding in the arachnoid space, which lies between the brain and the thin tissues that cover it. It can happen as a result of a trauma, such as a blow to the head, or it can occur spontaneously. According to one review of 51 studies done in 21 countries across the globe, the incidence of SAH is about 9 in 100,000. Risk grows with age, with individuals over age 85 bearing the highest risk. After age 60, women have a higher risk than do men—possibly a result of hormonal differences.

Although family history plays a role in an individual's risk for SAH, other factors may be even more important. Smoking, excessive use of alcohol, and/or high-blood pressure dramatically increase risk. In a small number of cases, sexual activity and heavy lifting have both triggered SAH. Mortality is high among SAH victims. The fatality rate is between 40% and 50%, so rapid treatment is critical.

Symptoms may include “thunderclap” headache (extreme and sudden pain), stiff neck, and sometimes vomiting, convulsions, and/or reduced eye movement. Emergency treatment may include surgery to stop the bleeding, removal of blood from the arachnoid space, and the medications mentioned above for other types of hemorrhagic stroke.

STROKE AND AGING

How is stroke related to aging?

Stroke is the number three cause of death in the United States and is the leading cause of serious, long-term disability. Among people over age 55, the incidence of stroke more than doubles with each additional decade of life. The death rate from stroke also increases with the age of the individual.

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