Treatment of Strokes

Treatment for stroke depends on whether the patient is diagnosed with an ischemic or hemorrhagic stroke. In either case the person must get to a hospital immediately for the treatments to work.

According to the Mayfield Brain & Spine Center, Ischemic stroke treatments can be divided into emergency treatments to reverse a blockage and preventive treatments to prevent stroke.

Emergency procedures

- Clot buster drugs (tPA)
- Clot retrieval devices

Preventive procedures

- Blood thinners
- Angioplasty/stents
- Carotid endarterectomy

Hemorrhagic stroke treatment focuses on stopping the bleeding.

- Subarachnoid hemorrhage (SAH) Bleeding from a damaged blood vessel causes blood to accumulate at the surface of the brain. Blood fills a portion of the space between the brain and the skull, and it mixes with the cerebrospinal fluid that cushions the brain and spinal cord. As blood flows into the cerebral spinal fluid, it increases pressure on the brain, which causes an immediate headache. In the days immediately following the bleeding, chemical irritation from clotted blood around the brain can cause brain arteries that are near to this area to go into spasm

- Intracerebral hemorrhage (ICH). Bleeding occurs from a broken blood vessel within the brain. Some things that increase your risk for this kind of hemorrhage are high blood pressure (hypertension),

heavy alcohol use, advanced age and the use of cocaine or amphetamines.

Clot buster drugs

Thrombolytic "clot-buster" drugs help restore blood flow by dissolving the clot that is blocking the artery. The most common "clot-buster" drug is tissue plasminogen activator, or tPA for short. TPA is an enzyme found naturally in the body that dissolves clots. Doctors inject extra tPA into the bloodstream to speed up this process. To be effective, tPA (Activase) should be given as quickly as possible. Patients who received tPA within 3 to 4 hours of onset of stroke symptoms were at least 33% more likely to recover from their stroke with little or no disability after 3 months [1,2]. TPA also can be delivered right at the clot site in a procedure called intra-arterial thrombolysis. In this method the tPA drug does not have to travel through your entire body before reaching the clot. A doctor called a neuro-interventionalist performs this procedure during an angiogram. A very small catheter is inserted into an artery in the groin and guided through the bloodstream up to the brain where the clot is located. The tPA drug is then released to dissolve the clot. The doctor also pushes the catheter back and forth through the clot to help break it up.

Clot retrieval devices

Large blood clots that block large arteries feeding the brain may not open fast enough with tPA. Stroke trials have shown that these larger blockages do not respond as often to this drug, even when it is given quickly. New devices, known as “thrombectomy devices,” are designed to grab the clot that is blocking the artery and pull it out, leaving the artery open. A neuro-interventionalist, (also called a neuro-endovascular surgeon), performs the procedure during an angiogram. A catheter is inserted into an artery in the groin and then passed through the blood vessels to the blockage. Two different devices can be used to grab the clot and remove it (Fig. 3).

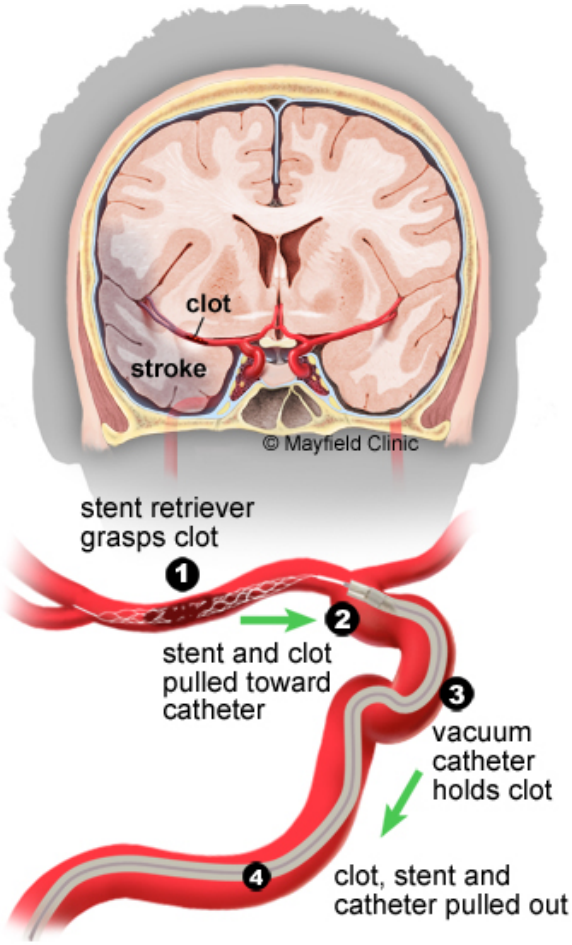

Figure 3. A stent retriever mesh is embedded in the clot and then used to pull the clot out of the artery and into the vacuum catheter.

- A stent retriever (or "stentriever") is a wire mesh tube, like a stent, that is attached to a long wire. When the tube is opened in the blocked artery, the clot gets stuck in the mesh. The doctor then pulls out the mesh using the long wire, pulling out the clot with it.
- An aspiration catheter is like a vacuum cleaner that is attached to a special suction unit and used to suck out the clot.

Studies have shown that each of these devices is more likely to open a blocked artery than the clot buster drug alone and that patients with large-artery strokes are more likely to improve with this treatment. Clot retrieval may be effective up to 6 hours after the onset of the stroke [3]. More recently, trials have shown that, for a small group of patients who wake up

with stroke symptoms or are between 6 to 24 hours after onset, clot retrieval may still be effective. If specialized imaging shows that the territory of the stroke is small, removing the clot can prevent the stroke from getting larger and more severe [4]. Still, the earlier treatment begins the better.

Blood thinners

Anticoagulants (“blood thinners”) such as warfarin, and antiplatelet agents such as aspirin, ticlopidine, diprydamole, or clopidogrel interfere with the blood's ability to clot and can play an important role in preventing stroke.

Angioplasty

Angioplasty is used to open blood vessels narrowed or blocked by plaque build-up in atherosclerosis. A neuro-interventionalist performs the procedure during an angiogram. A catheter is inserted into an artery in the groin and then passed through the blood vessels to the plaque build-up. The doctor guides the catheter through the bloodstream while watching a fluoroscopy (a type of X-ray) monitor. Once the catheter is positioned correctly, a balloon is inflated to flatten the plaques against the wall and open the artery to restore blood flow (Fig. 4).

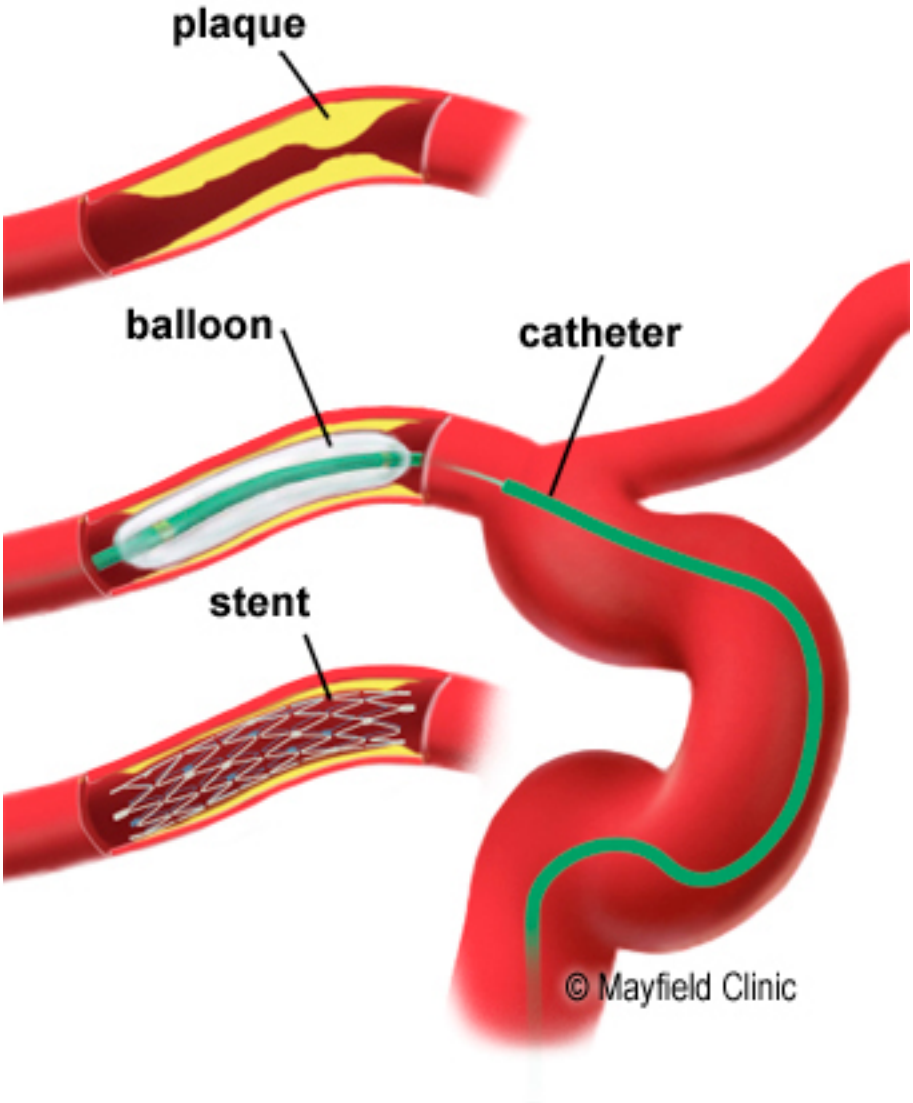

Figure 4. During angioplasty, a balloon-tipped catheter is placed within the narrowed vessel. The balloon is inflated compressing the plaque and opening the artery. The balloon is removed and a self-expanding mesh-like tube, called a stent, is placed over the plaque to hold open the artery. The stent remains in the artery permanently.

Carotid endarterectomy

Sometimes plaque build-up is too great to treat with angioplasty, and the plaque must be surgically removed. A common area for build-up of plaques is at the common carotid arteries in the neck where the internal and external carotid arteries branch. If the carotid artery is more than 70% blocked, an endarterectomy surgery may reduce the risk of stroke by 65% [5]. Through an incision in the neck, the carotid artery is opened and the plaque removed to restore blood flow (Fig. 5).

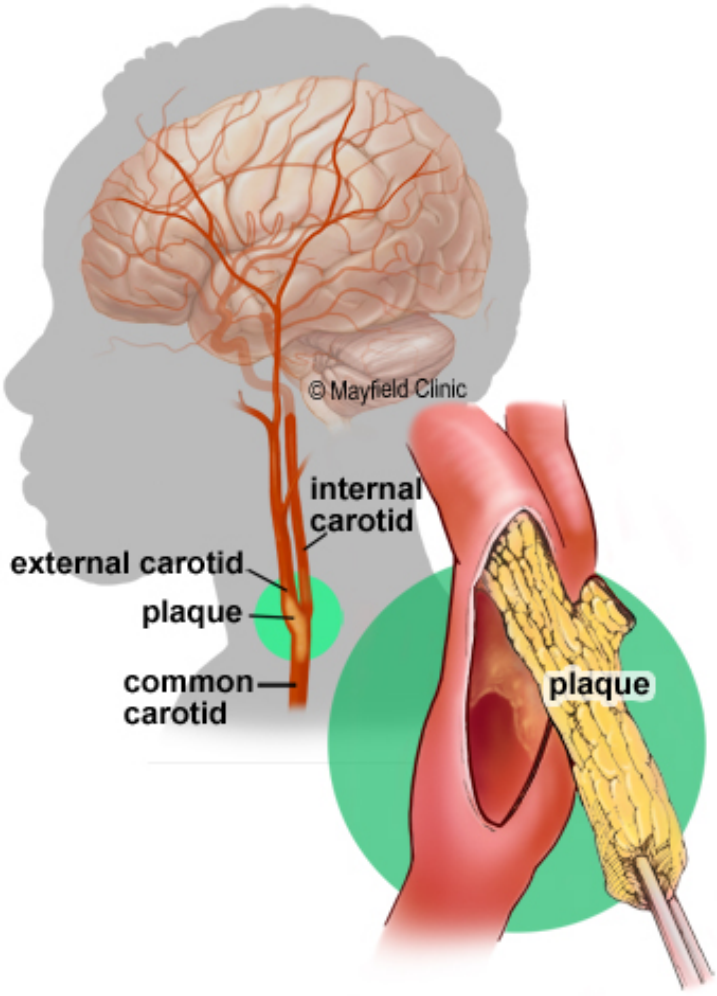

Figure 5. A carotid endarterectomy is a surgery to remove plaque from the area of the carotid artery where the internal and external carotid arteries branch.