

Predicting growth of brain aneurysms

Steven Karceski, MD

In their article “The ELAPSS score for prediction of risk of growth of unruptured intracranial aneurysms,” Backes et al.¹ developed a risk score for aneurysm growth. They followed 1,507 people who had 1,909 unruptured intracranial aneurysms (some people had more than 1 aneurysm). The patients were from several medical centers around the world: Canada, the Netherlands, Finland, China, and Japan. They were all over 18 years old. Their aneurysms were followed by several types of imaging: some centers used MRI, while others used CT angiography, or calibrated digital subtraction angiography. The local doctor decided how often to perform the studies.

In order to develop a risk score, Backes et al. carefully assessed several important factors regarding the aneurysms. First, the shape and size of the aneurysm was recorded. Growth of the aneurysm was defined as an increase in size by more than 1 mm or a change in the shape of the aneurysm. A history of aneurysm rupture, the location of the aneurysm, the person’s age, and heritage (genetic background) were also recorded.

WHAT WERE THE RESULTS? Aneurysm growth occurred in 14% of the aneurysms. This was similar to the 18% reported in a 2013 study.² Backes et al. estimated that when growth was detected, it took about 1.9 years for the change to occur.

Backes et al. found 6 predictors of aneurysm growth: earlier subarachnoid hemorrhage, age, population (for instance, North American descent vs Finland vs Japan), location, size, and aneurysm shape independently predicted aneurysm growth.¹ In short, the ELAPSS score predicted the growth of aneurysms. ELAPSS stands for earlier subarachnoid hemorrhage, location of the aneurysm, age, population, size (of the aneurysm), and shape (of the aneurysm).

WHY IS THIS IMPORTANT? Earlier studies had shown that aneurysm growth was a risk factor for aneurysm rupture. In fact, if the aneurysm grew, this study showed that there was a 12-fold increased risk that it would burst.² Backes et al. looked at 6 features of a person’s aneurysm. Using the ELAPSS scoring system, they found that this could predict which aneurysms were most likely to grow (or change).

Section Editors
David C. Spencer, MD
Steven Karceski, MD

About aneurysms

Steven Karceski, MD

WHAT IS AN ANEURYSM? Since it became widely available in the 1980s, MRI has evolved and improved, providing more detailed images than ever before. Better pictures have made it possible to study medical illnesses in great detail. This is especially true in the field of neurology, where doctors are now able to assess the living brain.

As more people have had MRIs of the brain, doctors have recognized that brain aneurysms are fairly common. It is estimated that about 3% (range 1%–5%) of adults have an unruptured cerebral (brain) aneurysm. If a person has 1 aneurysm, there is a 15%–20% chance that he or she will have another. Of these, 0.5%–3% will rupture.³

Aneurysms are an outpouching of a blood vessel. They form at a weak point in the blood vessel. Most often, this is at the place where the blood vessel branches into smaller vessels. The weak point allows the wall to puff out, much like a balloon. Often, the balloon is connected to the artery by a thin neck. Blood flows through this connection, from the artery into the aneurysm.

Aneurysms are classified based on several factors: size, shape, and location are a few. Small aneurysms measure 0–5 mm, medium ones 6–15 mm, large ones 16–25 mm, and giant aneurysms >25 mm.³ Some aneurysms have a simple, balloon-like shape. These are called saccular aneurysms. Other types cause the artery to widen: these are called fusiform. Some have a regular, smooth shape, like a single grape. Others are irregular, and have many lobules, similar to a bunch of grapes.

WHAT IS THE CONCERN ABOUT ANEURYSMS?

The largest concern about aneurysms is that they might pop, or rupture. If the aneurysm ruptures, blood gets into the fluid that surrounds the brain. This is called a subarachnoid hemorrhage. When the blood from the ruptured aneurysm goes into the brain itself, a stroke occurs. This is called a hemorrhagic stroke. In either case, if severe, serious neurologic problems can occur. The most serious of these is death, which happens in up to half of patients. In one study, 13% of people who had a ruptured aneurysm died before they could reach the hospital.⁴

WHAT ARE THE SYMPTOMS OF AN ANEURYSM?

Most people are not aware that they have an aneurysm. When a person does not have symptoms due

to the aneurysm, it is called asymptomatic. However, if an aneurysm ruptures, a person might experience a severe headache and a very stiff neck. Often, the headache will be the “worst of my life.” A person often becomes nauseous (and may vomit). They may become confused and drowsy, and experience changes in or blurring of their vision. Some people pass out when the aneurysm ruptures. In general, bleeding occurs more often with saccular aneurysms than with the fusiform type.

WHO GETS ANEURYSMS?

Anyone can have an aneurysm. However, they tend to occur most often in people who are older than 60 years. Women have more aneurysms than men. Aneurysms occur more in certain populations: people from Japan and Finland have aneurysms more often than others.⁵ In addition, aneurysms tend to occur more often in certain medical illnesses. People who have high blood pressure, are obese, smoke, or drink alcohol to excess are more likely to develop intracranial aneurysms. In addition, there are genetic illnesses that increase the risk of having an aneurysm. For instance, a person with a connective tissue disorder, which causes weakness of blood vessel walls, is more likely to have an aneurysm.

WHAT HAPPENS IF I HAVE AN ANEURYSM?

If an aneurysm is discovered, the doctor will consider many factors in order to determine the best possible course of action. For a person who is at high risk of rupture, surgery may be an option. There are 2 commonly performed surgeries. The first is surgical clipping. In order to do this, the surgeon opens the skull, and exposes the aneurysm. Metal clips are placed on the aneurysm (for instance, the neck of the aneurysm). This has a very high cure rate, but carries the risk of a surgical procedure.

Second, the aneurysm can be treated from inside. This treatment is called endovascular coiling or gluing. A small tube is inserted into an artery in the leg. The tube is threaded up to the aneurysm, where a small amount of material is introduced into the aneurysm. This causes the aneurysm to clot, reducing the risk of rupture. This is much less invasive than traditional surgery. However, the aneurysm can return.

Third, for simple, small aneurysms, a watch-and-wait approach may be taken. This is done because

the risk of a surgical procedure outweighs its potential benefits. In this instance, the person may have MRIs of the brain at certain intervals, carefully following the aneurysm for signs of change or growth. When a change occurs, there is a higher chance that the aneurysm will rupture.² In these instances, a person may then undergo a surgical procedure to prevent bleeding from happening.

This was one of the reasons that Backes et al. performed their study. Although it is reasonable to follow aneurysms, looking for changes, it is not clear who is at highest risk for aneurysm growth. By looking at possible risk factors for aneurysm growth, people who have the highest risk can be followed more closely.

REFERENCES

1. Backes D, Rinkel GJE, Greving JP, et al. ELAPSS score for prediction of risk of growth of unruptured intracranial aneurysms. *Neurology* 2017;88:1600–1606.
2. Villablanca JP, Duckwiler GR, Jahan R, et al. Natural history of asymptomatic unruptured cerebral aneurysms

evaluated at CT angiography: growth and rupture incidence and correlation with epidemiologic risk factors. *Radiology* 2013;269:258–265.

3. What you should know about cerebral aneurysms. Available at: www.strokeassociation.org. Accessed February 14, 2017.
4. Schievink WI, Wijdicks EF, Parisi JE, Piepgras DG, Whisnant JP. Sudden death from aneurysmal subarachnoid hemorrhage. *Neurology* 1995;45:871–874.
5. Wermer MJH, van der Schaaf IC, Algra A, Rinkel GJE. Risk of rupture of unruptured intracranial aneurysms in relation to patient and aneurysm characteristics: an updated meta-analysis. *Stroke* 2007;38:1404–1410.

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Steven Karceski

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