

# Patient information: Abdominal aortic aneurysm

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**DEFINITION** — An aortic aneurysm occurs when the walls of the main blood vessel that carries blood away from the heart (the aorta) bulges or dilates. An abdominal aortic aneurysm (AAA) is located in the abdominal area, near the navel ([show figure 1](#)). Aneurysms can also occur in other areas of the aorta, although the abdomen is the most common site. Abdominal aortic aneurysms are not related to aneurysms of the blood vessels in the brain.

Intact abdominal aortic aneurysms cause no health problems. However, large aneurysms can burst, or rupture, and cause heavy bleeding into the abdomen. A ruptured aortic aneurysm is a medical emergency requiring immediate treatment.

**RISK FACTORS** — Abdominal aortic aneurysms (AAA) are rare in people under the age of 60. About one person in 1000 develops an abdominal aortic aneurysm between the ages of 60 and 65, and this number continues to rise with age. Screening studies show that abdominal aortic aneurysms occur in 2 to 13 percent of men and 6 percent of women over the age of 65. However, almost 90 percent of the aneurysms identified by screening are small (less than 3.5 cm in diameter) and not dangerous.

In addition to age, a number of other factors may increase a person's risk of developing an abdominal aortic aneurysm:

- Smoking markedly increases risk for AAA. The risk is directly related to number of years smoking and decreases in the years following smoking cessation.
- Men develop AAAs four to five times more often than women.
- People who are white develop aortic aneurysms more commonly than other groups.
- People with other medical conditions, such as coronary heart disease and peripheral vascular disease, are more likely to develop AAAs.
- A family history of abdominal aneurysm increases the risk of developing the disease and interacts with the risks associated with age and gender. The risk of developing an aneurysm among brothers of a person with a known aneurysm who are older than 60 years of age is as high as 18 percent.

**Screening for AAA** — A screening test to determine if an AAA is present is recommended in certain groups of people [\[1\]](#). These recommendations are based upon the increased risk that older men, especially those who smoke or who have a family history of AAA, will develop an AAA.

The test used most commonly to screen for AAA is abdominal ultrasonography. This test is painless and involves the use of a wand, which is applied to the abdomen and uses high frequency sound waves to create an image of the abdominal aorta; aneurysms or other abnormalities can be seen in the image.

A screening test is recommended in the following groups:

- Men who are ages 65 to 75 and who have ever smoked should be screened one time for AAA with abdominal ultrasonography. There is little benefit of repeat screening after a man has a single negative ultrasound. Men over age 75 are unlikely to benefit from screening.

- Men 60 years of age or older who have a sibling or parent with an AAA should have a physical examination and ultrasound screening.
- There is no recommendation to screen women for AAA. Women who are concerned about their risk of AAA, based upon their family history or other risk factors, should discuss their concerns with their healthcare provider.

**SYMPTOMS** — Most abdominal aortic aneurysms are small and do not cause any symptoms. People without symptoms are usually unaware that they have an aneurysm.

Some aneurysms cause a noticeable, small pulsating mass near the navel. This may not be noticed by the patient, but can be detected by a healthcare provider during a routine physical examination. Approximately 30 percent of asymptomatic abdominal aortic aneurysms are discovered in this manner. Other aneurysms are during an ultrasound or x-ray of the abdomen, done for other reasons.

Some aneurysms can cause abdominal or back pain. Such aneurysms are typically detected during an evaluation for pain.

Most patients have little warning before rupture. Patients who develop pain or tenderness of the aneurysm may have had a recent increase in aneurysm size, which may predict rupture.

**TREATMENT** — Approximately 15,000 deaths occur each year in the United States due to abdominal aortic aneurysms, usually because of rupture. Once rupture has occurred, the success rate of surgery is much lower than if surgery is performed electively, prior to rupture. Thus, the goal of therapy is to prevent aneurysm rupture.

The primary treatment for AAA is surgery, which may be associated with a number of complications. Most small aneurysms do not rupture. Thus, the risk of elective surgery must be balanced against the risk of rupture of an untreated aneurysm. This decision requires understanding of the usual course in patients with untreated aneurysms.

**Risk of rupture** — The risk of rupture of an abdominal aortic aneurysm depends upon the size of the aneurysm and the rate at which it is expanding. The evidence suggests that aneurysms expand at a rate of about 0.3 to 0.4 centimeters per year (1 inch = 2.5 cm). The annual risk of rupture based upon aneurysm size is estimated as follows [2]:

- Less than 4.0 cm in diameter = No risk of rupture
- Between 4.0 to 4.9 cm in diameter = 0.5 to 5 percent
- Between 5.0 to 5.9 cm in diameter = 3 to 15 percent
- Between 6.0 to 6.9 cm in diameter = 10 to 20 percent
- Between 7.0 to 7.9 cm in diameter = 20 to 40 percent
- Greater than or equal to 8.0 cm in diameter = 30 to 50 percent

However, these numbers represent an average. There can significant variability in the rate of expansion, both from one patient to another and for a given patient from year to year. Many patients have long periods with little change in aneurysm size. Larger aneurysms tend to expand faster than smaller aneurysms.

Aneurysms that expand rapidly (for example, more than 0.5 cm over six months) are at high risk of rupture. Growth tends to be more rapid in smokers, and less rapid in patients with diabetes mellitus or peripheral arterial disease. Some aneurysms, for unclear reasons, remain relatively fixed in size for a period of time and then undergo rapid expansion. The risk of rupture of large aneurysms ( $\geq 5$  cm) is significantly greater in women than men (18 versus 12 percent) [3].

**General principles** — In all cases, the decision about if and when to have surgery is based upon the risks associated with the aneurysm itself and the risk of major surgery. Thus, most people with an aneurysm less than 4 cm (1.6 inches) in diameter are advised not to have immediate surgery, but rather to follow

the aneurysm over time; this is known as watchful waiting. Usually, this involves an ultrasound examination of the abdomen every six months. ([See "Watchful waiting" below](#)).

On the other hand, most patients with an aneurysm greater than 5.5 cm (2.2 inches) in diameter or that expands more than 0.5 cm over a six month period are advised to have surgery, as long as they can tolerate the procedure. Surgery may also be recommended for people with aneurysms that are greater than twice the size of a normal portion of the aorta. Surgery may not be possible in patients with serious heart or lung disease ([see "Surgery" below](#)).

People with an aneurysm between 4 and 5.5 cm should discuss their options with a physician; clinical trials have shown that outcomes are similar for patients who choose surgery or watchful waiting. Thus, the best approach will depend upon the risk of surgery and the risk of aneurysm rupture in an individual patient. Features influencing this decision include:

- The size and rate of growth of the aneurysm.
- The presence of symptoms; patients with aneurysms that are tender or associated with pain may be advised to have surgery.
- Extent of vascular disease; patients with aneurysms in other arteries (such as the iliac or femoral arteries of the leg) may do better with surgery than with watchful waiting.
- Surgical risk; the risk of surgery varies for each individual and the magnitude of risk may be estimated. Patients whose surgical risk is estimated to be high may do better with watchful waiting or alternatives to surgery ([see "Surgical risk" below](#), and ["Surgical alternatives" below](#)).

**Watchful waiting** — Small abdominal aortic aneurysms that are not expanding quickly are usually left alone and watched for changes in size, most often by ultrasound examination of the abdomen every six months. A small aneurysm that grows to be 5.5 cm or larger, or that expands more than 0.5 cm over a six month period of time should probably be repaired surgically, if possible ([show figure 2](#)).

Patients may also be advised to take a medication called a beta blocker, more commonly used to treat high blood pressure or coronary artery disease. Beta blockers decreased the expansion rate of abdominal aortic aneurysms in some studies.

Patients should call their doctor if they develop abdominal tenderness or back pain. These symptoms may be signs of impending rupture.

**Surgery** — Although patients with medium-sized aneurysms have similar outcomes with surgery and watchful waiting, surgery is recommended when the aneurysm is 5.5 cm (2.2 inches) in diameter or larger, is tender and painful, is expanding rapidly, or if the aneurysm occurs in a person with other disorders such as aneurysms in their iliac or femoral arteries ([show figure 3](#)).

Surgical correction of an abdominal aortic aneurysm involves removing the section of the abdominal aorta that is dilated and replacing it with a prosthesis made of synthetic material (also known as a graft). This will allow blood to flow normally and the artery wall to remain intact. Planned or elective surgery reduces the risk of rupture of large abdominal aortic aneurysms, and graft failure is uncommon ([show figure 1](#)).

Surgery is done in an operating room while the patient is under general anesthesia, and generally takes four to six hours. After surgery, a patient is taken to the intensive care unit for monitoring. Several catheters are used, including a urinary catheter (to drain the bladder), an arterial catheter (to monitor blood pressure), a central venous catheter (to monitor pressures in the heart), an epidural catheter (to give pain medicine), and a nasogastric tube (a tube from the stomach to the nose that is initially used to keep the stomach empty). Patients are generally able to go home after 4 to 7 days, and are able to resume normal activities within 4 weeks.

**Surgical risk** — Surgery of any kind carries certain risks that vary from one person to another, depending upon the patient's general state of health. The surgical risk for repair of an abdominal aortic aneurysm increases with age and the presence of other health conditions. As examples, people who have other heart or lung diseases, and people who smoke are more likely to develop complications such as pneumonia and

irregularities in their heart rate after surgery. In addition, older adults are more prone to develop problems (such as cardiac events and stroke) both during and after surgery.

Coronary artery disease is common in people who have abdominal aortic aneurysms. Thus, if there are other risk factors for heart disease (such as smoking, diabetes, high blood pressure), the doctor may recommend an evaluation of the heart prior to considering aneurysm surgery. This evaluation may range from a simple exercise stress test to heart catheterization.

**Surgical alternatives** — Patients who have a large abdominal aortic aneurysm but whose doctor feels that surgery is too risky may have options.

**Medication** — First, a medication called a beta blocker may be recommended to slow the rate of aneurysm growth. At least one clinical study showed that people who took beta blockers had a slower rate of growth of their AAA compared to people who took a placebo (0.36 versus 0.68 cm per year) [4].

**Endovascular stent graft** — A procedure called an endovascular stent graft has shown some success in patients with large AAAs. This procedure has fewer risks than aneurysm repair. It involves placing a needle in the femoral artery (in the groin) and advancing a catheter to the area of the aneurysm. Dye is injected to guide the placement of a stent-graft device into the area of the aneurysm. The device prevents blood flow through the aneurysm, thereby minimizing the risk of rupture.

There is less experience and data regarding endovascular stent grafts than surgery, and there is less information regarding long-term outcomes. As a result, stent grafts are not considered the first choice in patients who are healthy enough to undergo surgery. Stent grafts are primarily performed in patients deemed to be too high risk for conventional surgery.

**SUMMARY** — Most people with abdominal aortic aneurysms live healthy, symptom-free lives. The decision to undergo surgery involves weighing the risk of aneurysm rupture versus the risks of a surgical procedure. While some general guidelines are suggested based upon the aneurysm size and the rate at which it is enlarging, each treatment decision should be made on an individual basis. Patients should discuss their individual risk of surgery with an experienced healthcare provider to make an informed decision.

**WHERE TO GET MORE INFORMATION** — Your healthcare provider is the best source of information for questions and concerns related to your medical problem. Because no two patients are exactly alike and recommendations can vary from one person to another, it is important to seek guidance from a provider who is familiar with your individual situation.

A number of web sites have information about medical problems and treatments, although it can be difficult to know which sites are reputable. Information provided by the National Institutes of Health, national medical societies and some other well-established organizations are often reliable sources of information, although the frequency with which they are updated is variable.

- National Library of Medicine [www.nlm.nih.gov/medlineplus/healthtopics.html](http://www.nlm.nih.gov/medlineplus/healthtopics.html)
- National Heart, Lung, and Blood Institute [www.nhlbi.nih.gov/](http://www.nhlbi.nih.gov/)
- American Heart Association [www.americanheart.org](http://www.americanheart.org)
- Society of Thoracic Surgeons [www.sts.org/sections/patientinformation](http://www.sts.org/sections/patientinformation)

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