

Renal Artery Stenosis

National Kidney and Urologic Diseases Information Clearinghouse



National
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Renal artery stenosis (RAS) is the narrowing of one or both arteries that carry blood to the two kidneys. “Renal” means “kidney” and “stenosis” means “narrowing.” RAS can cause high blood pressure and reduce kidney function. RAS is often overlooked as a cause of high blood pressure.

You are at greater risk of developing RAS if you smoke or are overweight. RAS is most common in men between the ages of 50 and 70, but women and younger adults can also have it. High cholesterol, diabetes, and a family history of cardiovascular disease are also risk factors for RAS. High blood pressure is both a cause and result of RAS.

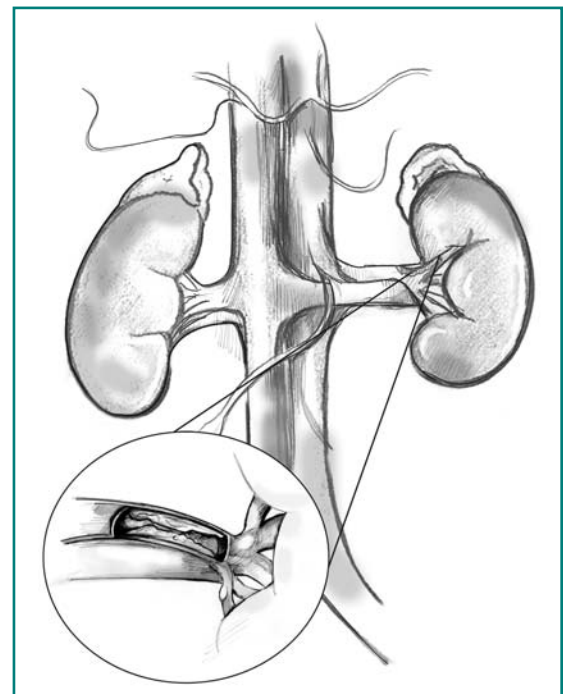
What are the kidneys?

Your two kidneys are bean-shaped organs, each about the size of a fist. They are located just below the rib cage, one on each side of the spine. The arteries that carry blood to the kidneys—called the renal arteries—branch off directly from the abdominal aorta, the main vessel from the heart that supplies blood to most of the body’s organs.

Healthy kidneys filter out wastes and extra fluid from the blood that passes through them. Those wastes and extra fluid become urine, which flows from the kidneys to the bladder through tubes called ureters. Urine is stored in the bladder until released through urination.

What causes RAS?

In an overwhelming majority of cases, RAS is caused by atherosclerosis, hardening of the kidney arteries. Thus, RAS develops when a material called plaque builds up on the inner wall of one or both of the renal arteries. The plaque makes the artery wall hard and narrow. This narrowing reduces or cuts off the blood supply, possibly damaging the kidney. The damaged kidney is less efficient at removing wastes and extra fluid from the blood. This plaque is similar to plaques blocking the arteries supplying the heart, which cause heart attacks, and



In renal artery stenosis, plaque builds up on the inner wall of the artery that supplies blood to the kidney.



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those blocking arteries supplying the brain, which cause strokes.

When the kidneys fail, wastes and extra fluid build up in the blood. This condition, called uremia, causes nausea, headaches, fatigue, and swelling in the legs and abdomen. With total kidney failure, you will need dialysis or a kidney transplant to stay alive.

What are the symptoms of RAS?

RAS can be silent, meaning you will not feel any symptoms, until it becomes severe.

The first sign of RAS may be high blood pressure that stays high even when you take blood pressure medicine. High blood pressure caused by RAS is called renovascular hypertension. Your doctor cannot diagnose RAS based on blood pressure alone because many conditions can cause your blood pressure to rise. If you develop high blood pressure suddenly and have no family history of high blood pressure, or if your blood pressure is difficult to control, your doctor might suspect RAS.

How is RAS diagnosed?

When blood flows through a narrow vessel, it makes a whooshing sound, called a bruit (BROO-ee). Your doctor may place a stethoscope on the front or the side of your abdomen to listen for this sound. The absence of this sound, however, by no means excludes the possibility of RAS.

For a more accurate diagnosis, your doctor may order an ultrasound or an angiogram to get a picture of the artery. An ultrasound uses harmless sound waves to create

images of internal organs; it does not require intravenous injection or oral administration of any substances. An angiogram is a special kind of x ray in which a thin, flexible tube called a catheter is threaded through the large arteries, often from the groin, to the artery of interest—in this case, the renal artery. A special dye is injected through the catheter so the renal artery will show up clearer on the x ray. The advantage of angiograms is that they give a better picture and therefore more accurate diagnosis of RAS; the disadvantage is that this procedure is more invasive.

More recently, doctors have been using computerized tomography (CT) scans and magnetic resonance angiograms (MRA) to evaluate RAS. CT scans use multiple x-ray images combined by a computer to create a three-dimensional image of your internal organs. MRAs use moving magnets to create similar three-dimensional images. CT scans and MRAs are less invasive than conventional angiograms, but the results may not be as clear or accurate. Researchers are exploring ways to improve these imaging techniques and make them more reliable for evaluating RAS.

How is RAS treated?

Approaches to RAS are threefold:

- preventing RAS from getting worse
- treating high blood pressure that results from RAS
- relieving the blockage of the renal arteries

Lifestyle Changes

The first step in treating RAS is making lifestyle changes that promote healthy blood vessels in general. Exercising, controlling your weight, and choosing healthy foods will help keep your arteries clean and flexible. If you smoke, quitting is one of the best things you can do to save your kidneys and other organs.

Blood Pressure Medicines

RAS causes high blood pressure, which can damage the kidneys. Damaged kidneys, in turn, can make your blood pressure even higher. If left uncontrolled, this vicious cycle can lead to kidney failure and damage the heart and blood vessels throughout the body.

Controlling renovascular hypertension is often difficult but usually achievable. It may require two or more different kinds of blood pressure medicine. Blood pressure medicines work in different ways.

Sometimes, by combining two or more blood pressure medicines that work in different ways, you may be able to control your blood pressure and stop the progression of kidney failure. Each type of blood pressure medicine has its own potential side effects; therefore, the choice of medicine is best determined by you and your doctor.

In addition to blood pressure medicines, your doctor may prescribe a cholesterol-lowering drug to prevent the plaques from forming in the arteries, and a blood-thinner, such as aspirin, to help the blood flow more easily through the arteries.

Surgery

If RAS advances until the artery is nearly or completely blocked, you may need surgery to open up the flow of blood to the kidney. Different types of surgery for RAS include the following:

- **Angioplasty and stenting.** Angioplasty is a procedure in which a catheter is put into the renal artery, usually through the groin, just as in a conventional angiogram. In addition, for angioplasty, a tiny balloon at the end of the catheter can be inflated to flatten the plaque against the wall of the artery. Then your doctor may position a small mesh tube, called a stent, to keep plaque flattened and the artery open.
- **Endarterectomy.** In an endarterectomy, a vascular surgeon cleans out the plaque, leaving the inside lining of the artery smooth and clear.
- **Bypass surgery.** To create a bypass, a vascular surgeon uses a vein or synthetic tube to connect the kidney to the aorta. This new path serves as an alternate route for blood to flow around the blocked artery into the kidney.

Hope Through Research

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) conducts and supports research into many kinds of kidney disease, including RAS. Researchers supported by the NIDDK are exploring ways to improve the diagnosis of this disease using new MRA techniques that provide more information about blood flow to the kidney and how well the kidney is functioning. These studies will point the way to more effective treatments for RAS and healthy kidneys.

For More Information

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Society for Vascular Surgery

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Email: vascular@vascularsociety.org

Internet: www.vascularweb.org

You may also find additional information on this topic using the following databases:

The NIDDK Reference Collection is a collection of thousands of materials produced for patients and health care professionals, including fact sheets, brochures, and audiovisual materials. Visit www.catalog.niddk.nih.gov/resources.

MedlinePlus brings together a wealth of information from the National Library of Medicine, the National Institutes of Health, and other government agencies and health-related organizations. MedlinePlus offers easy access to medical journal articles, a medical dictionary and medical encyclopedia, health information in Spanish, hospital and physician directories, drug and supplement lists, interactive patient tutorials, links to hundreds of clinical trials, and the latest health news. Visit www.medlineplus.gov.

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Publications produced by the Clearinghouse are carefully reviewed by both NIDDK scientists and outside experts. This fact sheet was reviewed by Alfred K. Cheung, M.D., University of Utah.

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U.S. DEPARTMENT OF HEALTH
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National Institutes of Health

NIH Publication No. 07-6020
May 2007