

Hypertension & Renal Artery Disease

The incidence of hypertension, or high blood pressure, is on the rise in the United States, with at least 50 million people affected. By definition, the diagnosis of hypertension is given when the systolic blood pressure (SBP) > 140 mmHg and/or the diastolic blood pressure (DBP) > 90 mmHg. Hypertension occurs in 10-20% of persons aged 25 to 45 years and 30-40% of persons aged 55 to 74 years. Although it is a “silent” disease in that patients usually have no specific symptoms, hypertension poses as a major risk factor for coronary artery disease (heart attack), cerebrovascular disease (stroke), and renal disease (kidney failure).

There are 2 categories of hypertension. Over 90% of all cases of high blood pressure are called “Essential Hypertension”, which has no specific identifiable cause but is due to the body’s inability to regulate the blood pressure within the normal range – SBP 120-140 mmHg/DBP 60-85 mmHg. Onset is usually between ages 30 and 50 years. Essential hypertension is treated with medication, diet, and fluid restriction and is not curable. “Secondary Hypertension”, on the other hand, is high blood pressure that has an identifiable cause, occurs in a wide age range, is severe, and is abrupt in onset. Secondary hypertension is potentially curable because it is most commonly caused by stenosis, or narrowing, of the renal (kidney) arteries. Less often, secondary hypertension can be caused by tumors of the adrenal gland that secrete hormones acting to increase the blood pressure.

Knowing that untreated or poorly managed hypertension has adverse consequences on the brain, heart, and kidneys, it is a very important disease to identify and aggressively treat. For patients with essential hypertension, treatment is accomplished with medication and lifestyle modifications. However, in those patients with a potentially correctable cause of hypertension, prompt recognition and treatment of the underlying cause may cure or dramatically improve blood pressure control and decrease related injury to the heart, brain, blood vessels, and kidneys.

Renovascular Hypertension

Patients with unusually high blood pressure (SBP > 200 mm Hg/DBP > 100 mm Hg) that requires more than the usual doses of medication to control are more likely to have secondary hypertension. A diagnosis of secondary hypertension may also be considered if patients who have had more mild hypertension (SBP 140-159 mmHg/DBP 90-99 mmHg) for many years become more difficult to control, requiring higher doses or additional medications for blood pressure control.

The most common cause of secondary hypertension is renal artery stenosis or narrowing of the arteries to the kidneys. The most common cause of narrowing is atherosclerosis, the buildup of fatty plaques inside the arteries. Blockage of the renal arteries causes the kidney to increase production of the hormone renin. Increased levels of renin in the body cause a cascade of events to occur that result in peripheral vasoconstriction (arteries to constrict or tighten) and fluid retention, causing an increase in blood pressure. Renovascular hypertension is particularly dangerous to the heart because of the direct toxic effects of the “renin-angiotensin system” on the heart muscle. In addition, as the renal arteries become narrow, the kidney is deprived of its normal blood flow, which can lead to kidney failure.

Signs and Symptoms

Some of the signs and symptoms associated with renovascular hypertension include:

- Onset of hypertension < 20 years of age and > 55 years of age
- Loss of control of blood pressure in presence of long-standing hypertension
- Accelerated rate of hypertension in any age group

- Presence of abdominal, epigastric or flank bruit
- Marked change (decrease) in adult kidney size
- Recurrent pulmonary edema in presence of poorly controlled hypertension

Diagnostic Testing

If you are suspected to have renovascular hypertension or your blood pressure has been difficult to control despite medication, a low salt diet, regular exercise and weight loss, your physician may refer you to a vascular surgeon for further evaluation.

Non-invasive testing: These tests are performed on an outpatient basis. They are virtually painless methods of examining the blood flow to the kidneys, with minimal associated side effects or risks.

LABORATORY TESTS: These blood and urine tests evaluate the extent of compromise in the functioning of the kidneys and the presence of other diseases (e.g. cardiac, endocrine)

DUPLEX SCANNING: This test gives an ultrasound picture of the abdomen and renal arteries, providing information on the size of the blood vessel and the state of its blood flow.

MAGNETIC RESONANCE IMAGING/ANGIOGRAM (MRI/MRA): This test is useful for imaging larger blood vessels

Invasive testing: Tests in this category involve the injecting of a contrast dye into the body while you are awake. It enables the physician to have more detailed information about the blood vessels.

ARTERIOGRAM (angiogram): This procedure is considered the “gold standard” of renal artery evaluation and is the most helpful in determining the diagnosis of renal artery stenosis and whether endovascular or surgical repair might be appropriate.

Treatment

If renal artery stenosis is detected, the vascular surgeon will determine which method of repair would be the most appropriate and beneficial for each patient’s unique situation.

ANGIOPLASTY: This is an endovascular technique that involves inflating a balloon within the narrowed artery to widen the vessel and improve flow. The balloon is introduced through a puncture site in either the groin (more common) or arm.

STENT PLACEMENT: A stent is a metal device that is placed inside the artery that acts as a scaffold to hold the artery open. Stenting is usually performed in conjunction with angioplasty, through the same puncture site.

For 60% to 80% of patients with renal artery stenosis, angioplasty (+ stenting) is successful and the artery remains open for a long time. Consequently, hypertension is significantly improved, and sometimes even cured. Unfortunately, balloon dilatation with stent placed cannot keep the narrowed renal artery open in 20% to 40% of patients with renovascular hypertension. For these patients, open surgery is required.

ENDARTERECTOMY: This operation involves an abdominal incision and a 7-10 day hospital stay. During the procedure, the narrowed artery is opened and the plaque is removed. The opening in the artery is then closed and blood flow is restored to the kidney.

BYPASS SURGERY: This method of repair also involves an abdominal incision and a 7-10 day hospital stay. A graft is placed to bypass or “go around” the area of blockage, thereby restoring blood flow and pressure to the affected kidney.

All of the above procedures can be performed on the artery of one kidney or, if necessary, both kidneys. The results of surgical intervention are excellent; 80% to 90% of patients have significant relief or are “cured” of hypertension.

Conclusion

Renal artery disease and renovascular hypertension are complex disorders that affect the heart, brain, blood vessels, and kidneys. Prompt diagnosis and timely intervention done by a skilled vascular surgeon can significantly decrease target organ damage and potentially cure high blood pressure due to renal artery disease.