



Isolated Systolic Hypertension

By: James L. Holly, MD

Isolated systolic hypertension (ISH) is defined as elevated systolic blood pressure in conjunction with normal diastolic blood pressure (<90 mm Hg). Previously, systolic pressure of more than 160 mm Hg was classified as ISH, and pressure between 140 and 160 mm Hg was classified as borderline ISH. In 1993 the definition of ISH was changed to any systolic blood pressure above 140 mm Hg together with diastolic blood pressure below 90 mm Hg. ISH is characterized by an increased pulse pressure, defined as the difference between the systolic and diastolic blood pressures.

Hypertension is present in more than half of all persons over 60 years of age, regardless of race. The majority of hypertensive patients in this age-group have ISH. Its prevalence increases with age, from about 5% of persons aged 60 years to almost 25% of those aged 80 years, and is higher in elderly women than in elderly men.

The number of elderly among the populations of the United States and many other countries is rising rapidly. At the beginning of the 20th century, only 4% of the US population was older than 65 years of age. By 2040, the comparable figure is estimated to be 21%. Clearly, therefore, ISH will be an important issue for years to come.

Why and how ISH develops

Many believe ISH to be a natural consequence of aging. However, no age-related increase in blood pressure is seen in relatively primitive societies whose members maintain lean body mass and are physically active. Factors that may play a role in the high prevalence of ISH seen in Western societies include increased body fat, sedentary lifestyle, and increased sodium intake.

One of the most important factors in the development of ISH is believed to be a loss of elasticity, and therefore of distensibility, of the aorta and peripheral arteries. Some compensation can be gained by dilatation of the aorta. An aorta with normal elastic properties is able to absorb much of the energy released during ventricular ejection, thereby attenuating the rise in systolic blood pressure.

Risks associated with ISH

A common misconception among patients and some practitioners is that elevated diastolic blood pressure is more important than elevated systolic pressure. This misconception most likely stems from studies on hypertension done in the 1960s and 1970s in which diastolic blood pressure was used as a measure of the efficacy of treatment. In fact, elevated systolic blood pressure has consistently been shown to be a better predictor of cardiovascular events, including stroke and myocardial infarction.

A study of more than 22,000 male physicians revealed that ISH was associated with a significantly increased risk of stroke and cardiovascular death. In a 15-year follow-up of over 300,000 patients screened for the Multiple Risk Factor Intervention Trial, ISH was identified as an independent risk factor for end-stage renal disease. Numerous epidemiologic studies have shown that ISH increases the risk of stroke threefold. ISH is also associated with a significantly increased risk of overall mortality, cardiovascular mortality, and congestive heart failure.

The continued reliance solely on diastolic blood pressure readings is puzzling, given the abundant data revealing ISH to be a major cause of morbidity and mortality.

Clinical trials

Many physicians have been reluctant to treat ISH out of the mistaken belief that it is a benign condition and for fear that lowering systolic blood pressure will result in strokes, a decline in renal function, and impaired cognition. Although more emphasis has been placed on the morbidity and mortality of ISH in recent years, evidence from clinical trials showing that treatment of ISH reduces adverse outcomes did not become available until the early 1990s.

The SHEP trial

The Systolic Hypertension in the Elderly Program (SHEP) was the first large-scale trial to document a benefit from treatment of ISH. The 4,736 patients enrolled in this double-blind, randomized, placebo-controlled study were 60 years of age or older. Participants received stepped-care treatment with chlorthalidone, and atenolol was added to the regimen if the target blood pressure was not achieved with chlorthalidone alone. The goal was to reduce systolic pressure to less than 160 mm Hg in those with initial readings of more than 180 mm Hg and to reduce the systolic pressure by 20 mm Hg in those with initial readings between 160 and 180 mm Hg. The primary end point was the number of fatal and nonfatal strokes in patients receiving treatment versus those receiving placebo. Secondary end points were cardiac events and overall mortality in these two groups.

Over a 5-year follow-up period, the SHEP trial showed an average systolic blood pressure of 155 mm Hg in patients taking placebo and 143 mm Hg in patients receiving medication. The overall results were very impressive. The number of strokes was reduced by 36% in the group receiving medication compared with the group receiving placebo. Analysis of secondary end points showed nonfatal myocardial infarctions plus death from

cardiac causes to have been reduced by 27% and major cardiovascular events by 32%. The incidence of congestive heart failure was cut in half by treatment with medication. The 13% reduction in all-cause mortality among patients receiving medication did not reach statistical significance.

Evaluation of the patient

Cases of ISH require careful attention to patient history, accurate assessment of blood pressure, and laboratory tests to identify concomitant medical problems.

Laboratory analysis

Laboratory tests should focus on assessment for concomitant medical problems as well as end-organ damage. A serum chemistry profile should be ordered to determine whether diabetes, renal disease, or hypokalemia is present. Chronic renal disease is the most common cause of secondary hypertension in the elderly. Unexplained low potassium should prompt suspicion for hyperaldosteronemia.

A urinalysis should be performed to rule out proteinuria, a sign of renovascular disease resulting from long-standing hypertension. An electrocardiogram can reveal evidence of prior myocardial infarction, arrhythmias, or left ventricular hypertrophy. Its sensitivity for left ventricular hypertrophy is poor, however. In one recent study the sensitivity ranged from 9% to 39%, depending on the criteria used. The specificity was in excess of 90%.

Echocardiography is the "gold standard" for diagnosis of left ventricular hypertrophy, but it is not cost-effective for every patient with hypertension. If the patient has signs or symptoms of congestive heart failure, echocardiography is indicated to measure left ventricular systolic and diastolic function. It is also indicated if the physical examination suggests the presence of valvular heart disease.

Treatment of ISH

Care must be taken not to diagnose ISH on the basis of only one blood pressure reading. If ISH is present on the initial reading, another reading should be taken after the patient has sat quietly for 10 to 15 minutes. If the reading is still elevated, the patient should be given advice regarding diet and exercise. Measures such as salt restriction, weight loss, exercise, and reduction or elimination of alcohol intake have documented efficacy in reducing blood pressure. In one study, 52% of hypertensive patients had a reduction in blood pressure to less than 140/90 mm Hg with weight loss and sodium restriction alone.

Patients with mildly or moderately elevated blood pressure should be allowed to try lifestyle modification for several months. For those with target-organ damage, as indicated by a history of myocardial infarction, stroke, or renal disease, pharmacologic therapy may need to be instituted sooner than for other patients.

While undergoing lifestyle modification, patients should be encouraged to have their blood pressure checked at home. Ambulatory 24-hour monitoring is available. Ideally, pressure should be measured with a cuff that has a mercury manometer by someone trained in the technique. If this is not feasible, an automated machine may be used. However, the machine should be checked to assure that the measurements obtained correlate with those obtained using a mercury manometer. Patients should be encouraged to keep a log of the measurements obtained at home. This is also an effective means of screening for so-called white coat hypertension (that caused by the anxiety of an office visit).

If ISH persists after lifestyle modification and is confirmed by home blood pressure monitoring, pharmacologic therapy is indicated. One of the best initial choices of an antihypertensive for elderly patients is a low-dose, long-acting diuretic, such as 12.5 mg daily of hydrochlorothiazide.

Concomitant medical conditions must be taken into account when selecting antihypertensive therapy. For example, if a patient has angina or a history of myocardial infarction, a beta blocker is appropriate. If mild renal insufficiency or cardiomyopathy is present, an angiotensin-converting enzyme inhibitor is a good choice. For a male patient with symptoms of benign prostatic hypertrophy, an alpha blocker would be a reasonable choice.

Difficult-to-control hypertension

In some patients the addition of a second, or even a third, antihypertensive agent is not successful in controlling hypertension. In such cases, several diagnostic possibilities other than essential hypertension must be considered, ie, true white coat hypertension, secondary causes of hypertension, and pseudohypertension.

White coat hypertension

White coat hypertension should be considered when blood pressure readings are significantly elevated in the absence of target-organ damage. Home blood pressure monitoring is the best way to diagnose this condition. Ambulatory 24-hour monitoring can be useful in determining if a patient's blood pressure rises during other potentially stressful situations. Home readings should be taken by someone trained in the proper technique, preferably using a cuff with a mercury manometer.

Isolated systolic hypertension (ISH) is the most common form of hypertension in the elderly. It is an even better predictor of morbidity and mortality than is diastolic blood pressure. Several large trials have documented a clear benefit to treating ISH. Therapy should be initiated only after careful evaluation of the patient's overall medical status, because the elderly are at increased risk of adverse effects from medications. Pharmacologic therapy should be started at a low dose and increased slowly, if necessary. If hypertension is still present after the addition of two or three medications, a cause other than essential hypertension should be considered, such as white coat hypertension, secondary hypertension, or pseudohypertension.

Learn about hypertension, remember it is your life and it is your health.