Aortic stenosis (AS) is a narrowing of the aortic valve outlet with resulting obstruction of blood flow from the left ventricle (LV). AS is not part of normal aging. Rather it usually occurs in association with risk factors such as smoking, diabetes, hyperlipidemia, hypertension, and congenital abnormalities of the aortic valve. Rheumatic heart disease is an infrequent cause of AS.

Patients initially develop sclerosis of the valve. About 5% of patients with sclerosis will develop overt stenosis over a 10-year period. Once stenosis develops, however, the progression from mild to severe stenosis is more rapid.

Clinical Presentation

Mild AS can be asymptomatic, but as stenosis progresses, patients may develop dyspnea, angina, or syncope. The presence of these symptoms portends a poor prognosis. Indeed, once symptoms develop, average survival without treatment is only 2-3 years.

Dyspnea results from LV failure. The stenotic valve causes resistance to LV outflow, resulting in LV hypertrophy and a depressed ejection fraction.

Angina is common, and is experienced by 2/3 of patients with AS. It results from the combination of increased oxygen needs of the hypertrophied LV myocardium, along with reduced delivery of oxygen because of decreased aortic outflow.

Syncope results from decreased aortic outflow and reduced cerebral perfusion. Arrhythmias can also cause syncope in AS, but they are uncommon unless there is marked LV dysfunction.

An unusual presentation of AS is Heyde syndrome, in which shear stress across a stenotic aortic valve causes degradation of the large multimeric glycoproteins of von Willebrand’s factor, which are needed for platelet function. Platelet dysfunction results, and there may be bleeding from lesions such as colonic angiodysplasia. Patients with AS should thus be monitored for gastrointestinal bleeding and anemia.

Diagnosis

The diagnosis of AS is often suspected after hearing a crescendo-decrescendo systolic murmur at the right upper sternal border on physical exam, though the intensity of the murmur does not predict severity of stenosis. The presence and severity of AS should be confirmed with a transthoracic echocardiogram.

Severity of AS is classified as mild, moderate or severe, based on parameters seen on echocardiogram. The frequency of routine echocardiographic surveillance of asymptomatic AS depends on the severity of stenosis, but a new echocardiogram should always be performed when there has been a change in signs or symptoms. The table shows the valve area that defines each category of severity, along with the interval at which a follow-up echocardiogram should be repeated to monitor for increasing stenosis.

Table 1. Severity of Aortic Stenosis and Recommended Interval for Follow-Up Echocardiograms

<table>
<thead>
<tr>
<th>Severity</th>
<th>Valve Area</th>
<th>Follow-up Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>3.0-4.0 cm²</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Mild</td>
<td>1.6-2.9 cm²</td>
<td>3-5 years, or sooner if there is a change in status</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.0-1.5 cm²</td>
<td>1-2 years, or sooner if there is a change in status</td>
</tr>
<tr>
<td>Severe</td>
<td>&lt; 1.0 cm²</td>
<td>Yearly, or sooner if there is a change in status</td>
</tr>
</tbody>
</table>

NOTE that other factors, including trans-valve gradient and velocity of flow across the valve, are also considered when determining severity of aortic stenosis.

Information from: American College of Cardiology/American Heart Association Guideline on Management of Patients with Valvular Heart Disease.

TIPS FOR DEALING WITH AORTIC STENOSIS

- Diagnose and monitor the progression of aortic stenosis (AS) with echocardiograms at intervals determined by severity of stenosis, or any time there is a change in the patient’s status (see Table).
- Recommend valve replacement surgery for patients with AS who have symptoms or left ventricular dysfunction.
- Recommend transcatheter aortic valve implantation for patients in whom valve replacement is indicated, but who are not suitable candidates for open surgical valve repair.
- Recommend palliative care, perhaps involving balloon valvuloplasty, for patients with AS in whom valve replacement is indicated, but who are not candidates for either surgical valve replacement or transcatheter valve implantation.
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Treatment

Surgical repair of aortic stenosis with valve replacement is the standard of care, and it improves symptoms and longevity. Valve replacement is indicated for patients with symptoms, and should also be considered for patients without symptoms if LV dysfunction is present. High-functioning, healthy older patients may do well with aortic valve surgery, and age alone is not a contraindication to surgery.

Both mechanical valves and tissue (biological) valves can be used, and each has advantages and disadvantages.

Mechanical aortic valves are more durable and thus last longer, but their risk of thromboembolic complications requires patients to receive lifelong anticoagulation, which can be risky for older adults. Tissue aortic valves, on the other hand are less durable but often do not require long-term anticoagulation. In general, tissue valves are recommended for patients over 65 years of age.

All patients with an aortic valve replacement should receive daily aspirin, regardless of the type of valve, and even if they are already receiving anticoagulation. Medical management with statins and angiotensin converting enzyme (ACE) inhibitors has not shown any survival benefit. Treatment with vasodilators and diuretics can cause systemic hypotension with the risk of syncope, myocardial infarction, and other complications.

Transcatheter aortic valve implantation (TAVI), also known transcatheter aortic valve replacement (TAVR), is an alternative to surgical valve replacement. The procedure has been approved by the Food and Drug Administration (FDA) as an alternative treatment for AS in patients who are not candidates for, or who are at high risk for, surgical valve replacement surgery. One-year mortality rates after TAVI are substantially reduced in comparison to those with balloon valvuloplasty, and valve failure is infrequent. Because of the good outcomes experienced by patients undergoing TAVI, many experts expect that use of TAVI, rather than valve replacement, may increase over time.

Percutaneous balloon valvuloplasty (valvotomy), in which a balloon is inserted via a percutaneous route and expanded in the aortic valve, was long used as an alternative treatment for patients whose general health or medical comorbidities made valve replacement surgery too risky. The procedure can temporarily relieve symptoms of AS, though restenosis is common in the first year after the procedure. Furthermore, there is a high rate of peri-procedural stroke. It is now used mainly as a palliative treatment for patients unable to undergo other procedures.

Palliative care, perhaps in combination with balloon valvuloplasty, may be the best option to maintain optimal quality of life for patients whose overall condition makes them inappropriate candidates for more definitive treatments. When dealing with such patients, the care team should help families realize how quickly patients with AS can sometimes deteriorate. Symptoms can worsen rapidly and death may occur sooner than families expect, so an early discussion about goals of care is important. Enrolling in a hospice program can help the patient and family manage symptoms and be a source of comfort and support.

References and Resources


ACOVE Quality Indicators

1. IF a vulnerable elder has newly diagnosed heart failure, THEN a history should be taken at the time of diagnosis and hospitalization to document the presence or absence of (conditions including) valvular heart disease.

2. IF a vulnerable elder has newly diagnosed heart failure, THEN echocardiography should be done within one month of diagnosis.