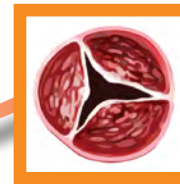


Aortic Stenosis in Seniors

With highlights from the 2014 ACC/AHA
practice guidelines for valve disease



Aortic stenosis (AS) is primarily caused by calcification of the aortic valve (calcific AS), which is increasingly seen with age. Calcific AS is an active disease process with many similarities to atherosclerosis including lipid accumulation, inflammation, and calcification.

Even though aortic valve replacement surgery (AVR), and the newer transcatheter aortic valve replacement procedure (TAVR), greatly improve survival and quality of life in persons with severe AS, the condition remains undertreated in older patients. Studies have shown that this may, in part, be due to the incorrect belief that age alone is a contraindication to valve replacement.

While a cardiologist will most likely handle your patient's treatment, you play a crucial role in diagnosis and can provide valued advice during treatment decisions. This guide provides diagnosis and treatment information, as well as tips on having a conversation with your patient about AS and treatment.



Recommendations from the ACC/AHA 2014 practice guidelines are **highlighted** in blue throughout.



Recognizing Symptomatic Aortic Stenosis

Symptoms of Severe AS Can Include:

- Dyspnea
- Dizziness
- Lightheadedness
- Syncope
- Fatigue and/or weakness
- Exercise intolerance
- Angina
- Shortness of breath
- Swelling of the ankles

Many of these symptoms will occur during activity but may also occur during rest as the disease progresses. It is also important to note that all of the above symptoms can also be caused by many other cardiac and non-cardiac disorders.

Some of these “classic” symptoms may be absent in older patients or progress at a rate that makes it seem like they are a consequence of “normal” aging. This makes it especially important to ask about all possible symptoms during your routine symptom screening.

Age —The Primary Risk Factor

Known Risk Factors Include

- Age—significantly more common with advancing age
- Gender—more common in men than women
- Aortic sclerosis*—a precursor for AS
- Congenital abnormalities such as a bicuspid valve
- History of rheumatic fever

*Aortic sclerosis—thickening of the valve without obstruction of outflow—is associated with clinical factors like age, hypertension, smoking, high serum low-density lipoprotein and lipoprotein(a) levels, and diabetes mellitus. Since aortic sclerosis often progresses to stenosis, these clinical factors—including those controllable by lifestyle—may play a role in the development and progression of AS.



Screening For & Diagnosing Aortic Stenosis

A stenotic valve causes a pressure gradient between the left ventricle and the aorta—the more severe the stenosis, the higher the gradient between systolic pressures. AS can usually be diagnosed clinically and confirmed or clarified through echocardiography.

Physical Exam

The carotid pulse may reveal a slow-rising and low volume pulse. Systolic blood pressure can still be high, even in patients with severe AS.

Cardiac Auscultation

An AS murmur is systolic and harsh in quality and can be heard at the right and left upper sternal border with the patient leaning forward. It is a late-peaking, systolic murmur that radiates to the carotids; has a single or paradoxically split second heart sound (S2); and a delayed and diminished carotid upstroke. As it progresses the murmur peaks closer to the 2nd heart sound, which becomes softer. A 3rd and 4th sound may also become noticeable. Note that in older adults, the carotid upstroke may be normal and the murmur may be soft or radiate to the apex due to changes in vasculature with aging.

Echocardiography

Evaluates the valve and shows aortic valve area, poorly mobile aortic leaflets, high gradient across the left ventricular outflow tract, left ventricular hypertrophy, and other abnormalities. Also provides measurements of maximum jet velocity, mean transvalvular pressure gradient, and valve area by the continuity equation or rarely, planimetry. **While these measures are a good indicator of severity, AS exists on a disease continuum so no single value can define severity. Therapeutic decisions should also be largely based on the presence or absence of symptoms.**

[See the table on the next page for guidance on determining stages/severity.]

Recommended for:

- **Diagnosis and assessment of AS severity**
- **Re-evaluation of patients with known AS but with changing symptoms/signs**

Electrocardiography

Usually reveals signs of left ventricular hypertrophy.

Cardiac Catheterization and Coronary Angiography

Assesses coronary circulation and confirms or clarifies clinical diagnoses.

Recommended:

- **Before surgical AVR in AS patients at risk for coronary artery disease (CAD)**
- **For AS severity assessment when noninvasive tests are inconclusive or inconsistent**
- **Before surgical AVR or TAVR for patients for whom the Ross procedure is contemplated**

Not recommended in asymptomatic patients.

Exercise Testing

May identify limited exercise capacity, exercise-induced symptoms, and abnormal blood pressure responses in asymptomatic patients. This can give information about prognosis as well as provide a basis for advice about physical activity. Many consider it useful as a guide to aortic valve replacement in asymptomatic patients. **It should NOT be performed in symptomatic patients due to high risk of sudden death.**



Stages of Valvular AS—from the 2014 ACC/AHA 2014 practice guidelines



Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AS	<ul style="list-style-type: none"> • BAV (or other congenital valve anomaly) • Aortic valve sclerosis 	<ul style="list-style-type: none"> • Aortic $V_{max} < 2$ m/s 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None
B	Progressive AS	<ul style="list-style-type: none"> • Mild-moderate leaflet calcification of a bicuspid or trileaflet valve with some reduction in systolic motion OR • Rheumatic valve changes with commissural fusion 	<ul style="list-style-type: none"> • Mild AS: Aortic V_{max} 2.0-2.9 m/s OR Mean $\Delta P < 20$ mm Hg • Moderate AS: Aortic V_{max} 3.0-3.9 m/s OR Mean ΔP 20-39 mm Hg 	<ul style="list-style-type: none"> • Early LV diastolic dysfunction may be present • Normal LVEF 	<ul style="list-style-type: none"> • None
C	Asymptomatic severe AS				
C1	Asymptomatic severe AS	<ul style="list-style-type: none"> • Severe leaflet calcification OR Congenital stenosis with severely reduced leaflet opening 	<ul style="list-style-type: none"> • Aortic $V_{max} \geq 4$ m/s OR Mean $\Delta P \geq 40$ mm Hg • AVA typically is ≤ 1.0 cm² OR (AVAi ≤ 0.6 cm²/m²) • Very severe AS is an aortic $V_{max} \geq 5$ m/s OR Mean $\Delta P \geq 60$ mm Hg 	<ul style="list-style-type: none"> • LV diastolic dysfunction • Mild LV hypertrophy • Normal LVEF 	<ul style="list-style-type: none"> • None—exercise testing is reasonable to confirm symptom status
C2	Asymptomatic severe AS with LV dysfunction	<ul style="list-style-type: none"> • Severe leaflet calcification OR Congenital stenosis with severely reduced leaflet opening 	<ul style="list-style-type: none"> • Aortic $V_{max} \geq 4$ m/s OR Mean $\Delta P \geq 40$ mm Hg • AVA typically is ≤ 1.0 cm² OR (AVAi ≤ 0.6 cm²/m²) 	<ul style="list-style-type: none"> • LVEF $< 50\%$ 	<ul style="list-style-type: none"> • None
D	Symptomatic severe AS				
D1	Symptomatic severe high-gradient AS	<ul style="list-style-type: none"> • Severe leaflet calcification OR Congenital stenosis with severely reduced leaflet opening 	<ul style="list-style-type: none"> • Aortic $V_{max} \geq 4$ m/s OR Mean $\Delta P \geq 40$ mm Hg • AVA typically is ≤ 1.0 cm² OR (AVAi 0.6 cm²/m²) but may be larger with mixed AS/AR 	<ul style="list-style-type: none"> • LV diastolic dysfunction • LV hypertrophy • Pulmonary hypertension may be present 	<ul style="list-style-type: none"> • Exertional dyspnea OR decreased exercise tolerance • Exertional angina • Exertional syncope OR presyncope
D2	Symptomatic severe LFLG AS with reduced LVEF	<ul style="list-style-type: none"> • Severe leaflet calcification with severely reduced leaflet motion 	<ul style="list-style-type: none"> • AVA ≤ 1.0 cm² with resting aortic $V_{max} < 4$ m/s OR Mean $\Delta P < 40$ mm Hg • Dobutamine stress echo shows AVA ≤ 1.0 cm² with $V_{max} \geq 4$ m/s at any flow rate 	<ul style="list-style-type: none"> • LV diastolic dysfunction • LV hypertrophy • LVEF $< 50\%$ 	<ul style="list-style-type: none"> • HF • Angina • Syncope OR presyncope
D3	Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS	<ul style="list-style-type: none"> • Severe leaflet calcification with severely reduced leaflet motion 	<ul style="list-style-type: none"> • AVA ≤ 1.0 cm² with resting aortic $V_{max} < 4$ m/s OR Mean $\Delta P < 40$ mm Hg • Indexed AVA ≤ 0.6 cm²/m² and • Stroke volume index < 35 mL/m² • Measured when patient is normotensive (systolic BP < 140 mm Hg) 	<ul style="list-style-type: none"> • Increased LV relative wall thickness • Small LV chamber with low stroke volume • Restrictive diastolic filling • LVEF $\geq 50\%$ 	<ul style="list-style-type: none"> • HF • Angina • Syncope OR presyncope

AVA = aortic valve area
AVAi = AVA-indexed-to-body surface area

BAV = bicuspid aortic valve
LFLG = low-flow/low-gradient

LV = left ventricular fraction
LVEF = left ventricular ejection

V_{max} = maximum aortic stenosis jet velocity
 ΔP = pressure difference

Optimal Treatment

Surgical AVR

The only way to eliminate AS is to replace the valve. Aortic valve replacement (AVR) surgery is an effective treatment for adults with severe, symptomatic, calcific AS. Surgery for AS alleviates symptoms, increases survival, and significantly improves quality of life in patients of all ages. Surgical AVR is the only approved valve replacement procedure for patients at low and moderate surgical risk.

For most patients, there is relatively low risk of operative mortality and complications* from AVR surgery. While surgical risks rise slightly with age, **age alone is not a contraindication**. In the absence of significant comorbidities such as cancer or advanced kidney, liver, or lung disease, virtually all symptomatic AS patients are candidates.

Stenotic valves can be replaced with mechanical or bioprosthetic valves—both have specific risks and benefits. While mechanical valves last longer, bioprosthetic valves may be used in elderly patients who cannot take anticoagulants.

* Operative risks can be estimated using well-validated on-line risk factors from the Society for Thoracic Surgeons and the European System for Cardiac Operative Risk Evaluation.

Surgical AVR and Symptomatic Patients

Indicated for patients with:

- Severe AS undergoing coronary artery bypass graft surgery (CABG) or surgery on the aorta or another heart valve
- Severe AS and LV systolic dysfunction (ejection fraction <0.5)

Reasonable for patients with:

- Moderate AS undergoing CABG or surgery on the aorta or another heart valve

Surgical AVR and Asymptomatic Patients

May be considered if disease is severe and:

- Exercise triggers symptoms
- Calcification is severe and rapid progression or delays in surgery are expected
- Patient is undergoing CABG or other heart surgery (even with moderate disease), if evidence that progression may be rapid
- Patients with unexpected limitation or abnormal hemodynamics during exercise testing
- If expected operative mortality is 1.0% or less

Age is not a contraindication to surgery! Patients that are otherwise healthy and have strong heart muscles are good candidates for surgery—no matter what their age. It is reasonable for older patients to elect surgical AVR as long as they have been clearly informed of the risks.

Balloon Valvotomy

This is not as successful long-term but may be an option for patients with congenital or rheumatic AS as a bridge to surgery in hemodynamically unstable adult patients with AS, or for those whose comorbid conditions preclude AVR.

Transcatheter AVR Procedure

This new technique is minimally invasive and places the new valve through an artery in the leg or from between two ribs, and does not require the use of a heart-lung machine. Surgical AVR is still the preferred treatment for AS patients; but TAVR is a good alternative for those that are at high risk for surgical complications. Risks for TAVR include stroke and damage to leg vessels.

Monitoring the Disease

Most **asymptomatic** patients do not need immediate surgery but should be monitored regularly. **They should be reevaluated with transthoracic echocardiography every 1-2 years for moderate cases, and every 3-5 years for mild cases.** Patients should also be advised to report any changes or symptoms immediately.

Once a patient becomes symptomatic, risk of sudden death increases dramatically and valve replacement should be undertaken as soon as possible. Patients with moderate to severe AS should avoid competitive sports and all other exercise as advised. Prophylactic antibiotics to prevent endocarditis are no longer universally recommended.

Medications

Because AS is progressive and can lead to serious complications including sudden death, symptomatic patients should be treated medically only if they have contraindications to, or elect not to have valve replacement. No medical treatments have been proven to prevent or delay the disease process; however, some medications such as digitalis and diuretics may provide temporary symptom relief.

Because of the similar clinical factors and disease mechanisms of AS and atherosclerosis, some studies have explored the benefit of statins in slowing disease progress. While studies have not confirmed this hypothesis, evaluation and modification of cardiac risk factors is important in preventing concurrent coronary artery disease.



Prognosis of Older Patients

Without Replacement Surgery

AS is progressive and will not improve without treatment:

- **Average progression of stenotic valve once moderate stenosis is present:**
 - Valve area decrease of 0.1 cm²/yr
 - Mean pressure gradient increase of 7 mm Hg/yr
 - Jet velocity increase of 0.3 m/second/yr
- Untreated AS can lead to pulmonary hypertension, arrhythmias, congestive heart failure, and sudden death
- Symptomatic AS significantly decreases lifespan:
 - Average survival is 2 - 3 years after the onset of symptoms, with a high risk of sudden death
 - Average life expectancy after heart failure is 6 - 24 months

With Replacement Surgery

Surgery greatly increases survival and improves quality of life:

- 80% of people who survive surgery have marked symptom improvement
- Majority return to their own homes and retain independence after surgery
- Post-operative lifespan in older patients is comparable to healthy patients of similar age
- Older patients do have a higher risk of operative mortality, arrhythmias, and surgical complications such as stroke and acute renal failure



Highlights from the ACC/AHA 2014 practice guidelines.



Talking to Your Patients About Aortic Stenosis

You have built a relationship of trust with your patients and play an important role in their understanding of the disease and their decision-making.

Explain Important Terminology

This may be the first time many of your patients have heard of AS. Take some time to explain the heart's anatomy, the course of the disease, and key terms. It may be helpful to relate aortic stenosis to other cardiovascular diseases that they know more about.

Discuss Benefits and Risks of Valve Replacement (Both Surgical and Transcatheter)

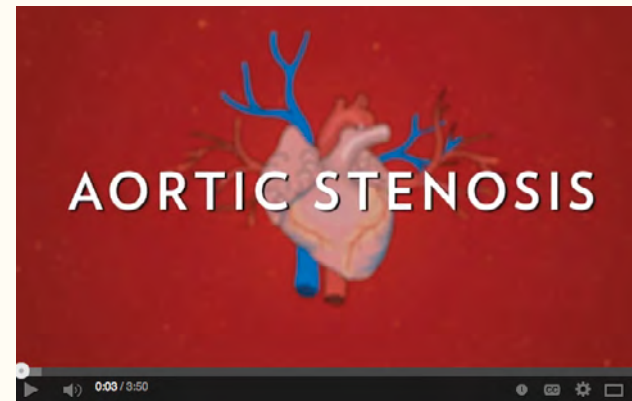
Explain that medication will only ease symptoms but that valve replacement can eliminate symptoms and add healthy years to their life. For many, surgical risks are typically small.

Emphasize That Age is Not a Contraindication

Your older patients may be nervous and incorrectly feel that SAVR and TAVR are inappropriate at their age. Explain that valve replacement is often a great success story in older patients.

Additional Resources

Direct your patients to a short "[pocket film](#)" on the basics of aortic stenosis, also produced by the Alliance for Aging Research.



[Watch a series of videos](#) from the Alliance for Aging Research for additional information on AS from a leading expert in the field.






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