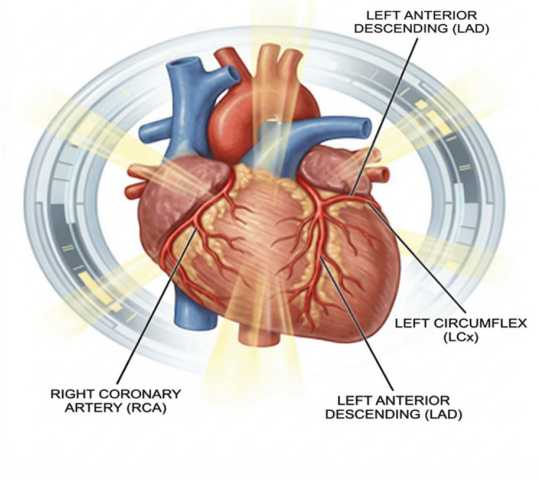
# Understanding Aortic Stenosis

## What It Is. How It Progresses. When to Act.

*Know Your Valve. Watch Symptoms. Decide Together.*




**Online:** https://go.riasalimd.com/as-guide

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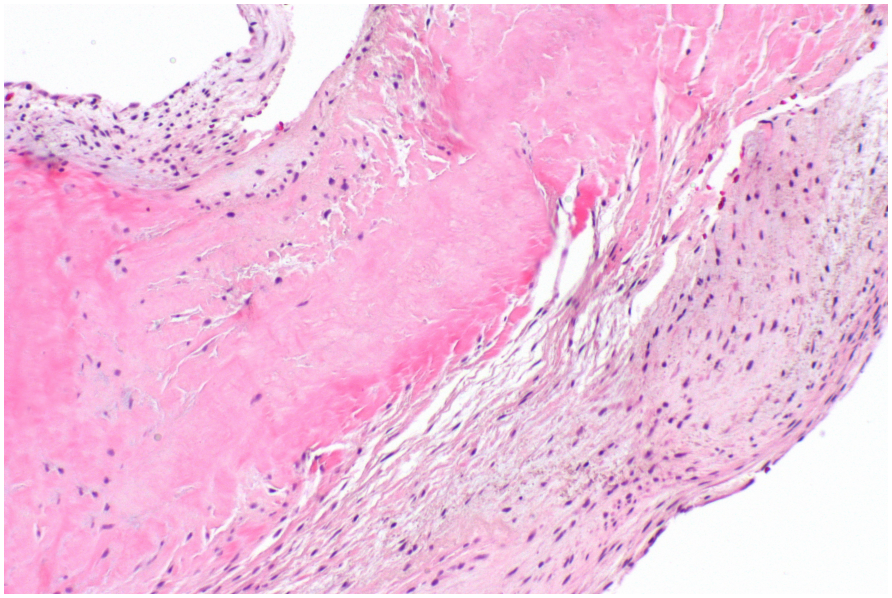
# Names & Terms You Will Hear

| Term | Meaning |
|---|---|
| Aortic Stenosis (AS) | the medical name we use in the chart |
| Aortic valve stenosis | longer form, same meaning |
| Calcific aortic stenosis | the most common kind in older adults — calcium build-up on the leaflets |
| Degenerative AS | another name for calcific AS |
| Bicuspid aortic valve (BAV) | born with two leaflets instead of three; tends to develop AS earlier |
| Rheumatic aortic stenosis | from rheumatic heart disease (rare in the US, common globally) |
| Critical AS | very severe AS — valve area at or below 0.6 $cm^2$ or symptoms despite trial of medicines |
| Severe AS | valve area ≤ 1.0 $cm^2$, mean gradient ≥ 40 mm Hg, peak velocity ≥ 4 m/s |
| Symptomatic AS | AS with symptoms (shortness of breath, chest pain, fainting); usually triggers intervention |
| Asymptomatic AS | AS with no symptoms — needs surveillance, sometimes early intervention |
| AVA | Aortic Valve Area — the size of the opening in $cm^2$ |
| Gradient | the pressure jump from the heart into the aorta as blood crosses the valve |

# What Is Aortic Stenosis?

- The aortic valve is the door from the heart's main pumping chamber (left ventricle) into the body's main artery (the aorta).
- Aortic stenosis means that door is narrowed. The heart has to work harder to push blood through.
- It is one of the most common valve problems in older adults — about 1 in 8 adults over 75 has at least mild AS.
- Untreated severe AS is dangerous. Once symptoms appear, average survival without valve replacement is only about 2 years.
- The good news: AS is fixable. Two well-tested treatments (TAVR and SAVR) restore normal blood flow.



A real histology slide of a calcified aortic valve leaflet. The pink/white deposits are calcium buildup — this is what makes the valve stiff and hard to open. Image credit: Nephron, Wikimedia Commons (CC BY-SA 3.0).

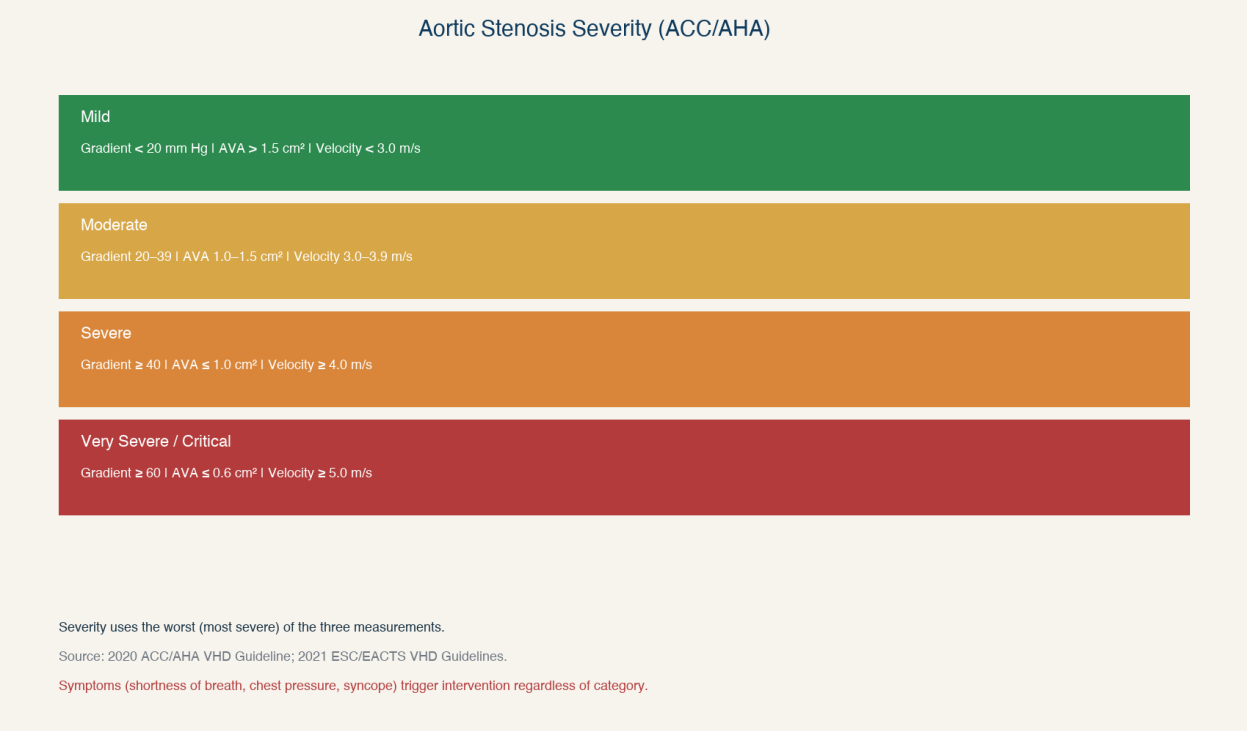
# Causes — Why the Valve Narrows

- Calcific (degenerative) — most common in patients over 65. Calcium builds up on the leaflets over decades. Like atherosclerosis, but on the valve.
- Bicuspid aortic valve (BAV) — born with two leaflets instead of three. Affects about 1–2% of people. Tends to cause AS 10–20 years earlier than calcific.
- Rheumatic — from rheumatic heart disease (after streptococcal infection in childhood). Rare in the US; still common in lower-income countries.
- Radiation-induced — chest radiation for cancer (Hodgkin lymphoma, breast cancer) can damage valves over years.
- Congenital — rare unicuspid or quadricuspid valves; usually picked up in younger patients.

# How Severe Is It? (Echo Numbers)

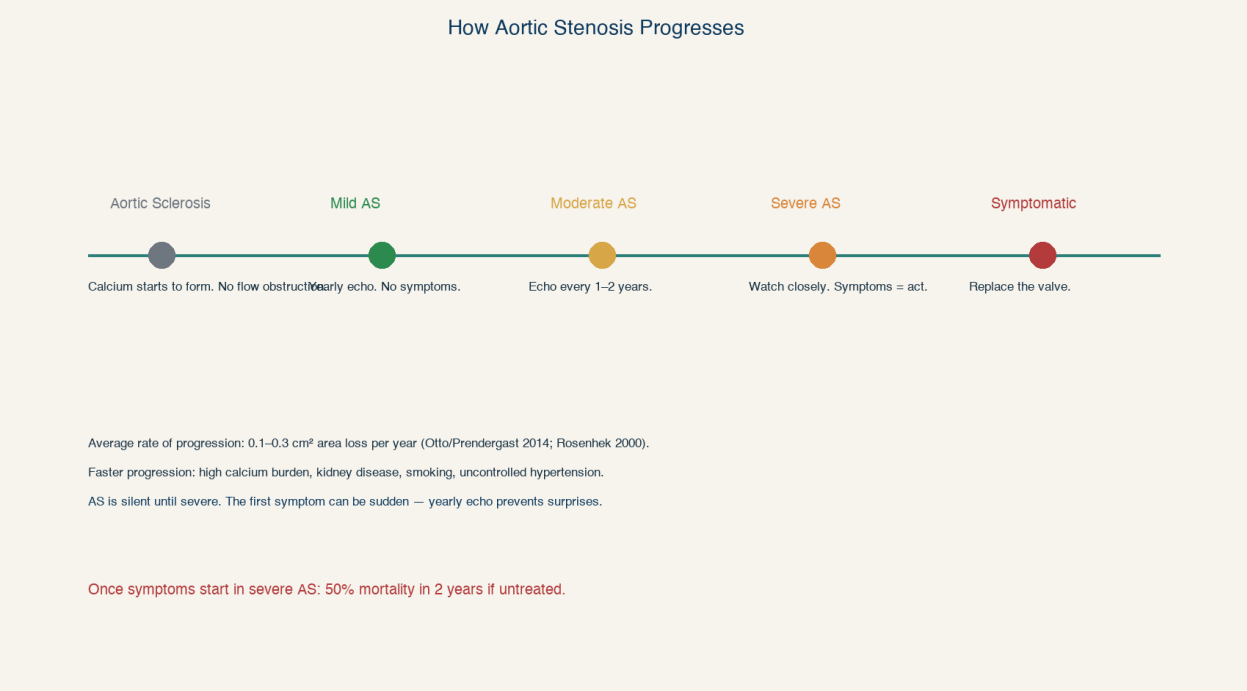
Your echocardiogram gives three measurements that together define severity. We use the worst (most severe) of the three.

| Category | Mean Gradient | Valve Area (AVA) | Peak Velocity |
|---|---|---|---|
| Mild | Less than 20 mm Hg | Greater than 1.5 cm² | Less than 3.0 m/s |
| Moderate | 20 to 39 mm Hg | 1.0 to 1.5 cm² | 3.0 to 3.9 m/s |
| Severe | 40 mm Hg or more | 1.0 cm² or less | 4.0 m/s or more |
| Very severe / critical | 60 mm Hg or more | 0.6 cm² or less | 5.0 m/s or more |



# How AS Progresses Over Time

- Once any AS is diagnosed, it usually worsens at a steady rate of about 0.1 to 0.3 cm² area loss per year.
- Faster progression: more calcium on echo, kidney disease, smoking, hypertension, older age.
- Slower progression: bicuspid valves in younger patients (sometimes), aggressive risk-factor control.
- Progression is silent. The valve narrows years before symptoms start.
- Mild AS rarely needs anything beyond yearly check-ups.
- Moderate AS needs an echo every 1 to 2 years and a closer eye on symptoms.
- Severe AS needs an echo every 6 to 12 months and a full symptom review at every visit.



# How We Diagnose AS

- Echocardiogram (echo) — the gold standard. Measures gradient, AVA, leaflet motion, and the heart's response.
- Transthoracic echo (TTE) — done from outside the chest. First-line, non-invasive.
- Transesophageal echo (TEE) — a probe in the esophagus, done in special cases (poor TTE windows, planning intervention).
- Cardiac CT — used to plan TAVR (annulus size, coronary heights) and to assess calcification when echo is borderline.
- Stress echo — when symptoms are unclear and we want to see how the valve and heart behave with exertion.
- Cardiac catheterization — rare these days for AS; used when echo is non-diagnostic or to check coronaries before surgery.
- BNP / NT-proBNP — elevated in advanced disease; helps spot early decompensation.

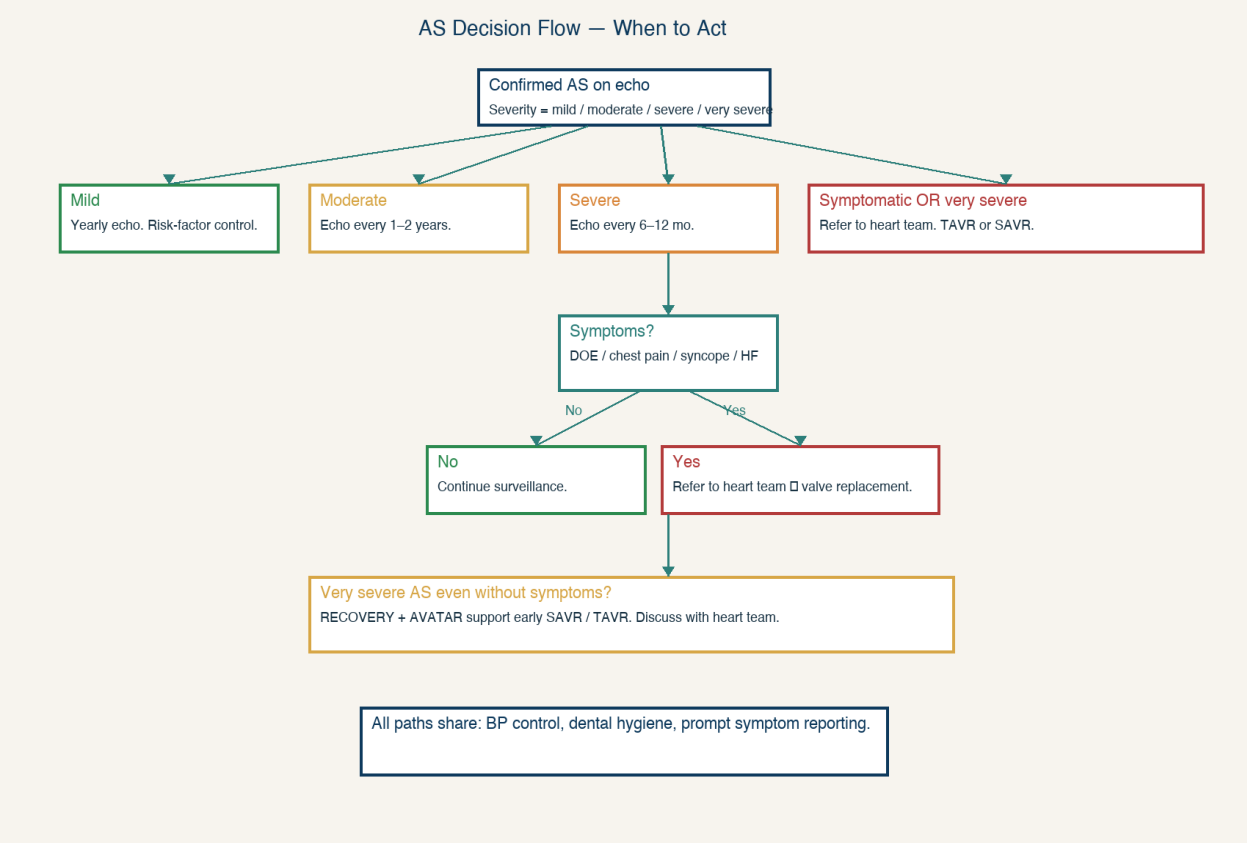
# Symptoms

AS is often silent until severe. When symptoms appear, they are the strongest trigger to act.

- Shortness of breath with exertion — most common first symptom.
- Chest pressure or angina — sometimes called 'effort angina'.
- Fainting (syncope) — especially with exertion. A warning sign that requires urgent evaluation.
- Fatigue or reduced exercise capacity — easy to dismiss as 'getting older'.
- Heart failure signs — leg swelling, sleeping on more pillows, waking short of breath.
- Palpitations — especially atrial fibrillation, which can become poorly tolerated when AS is severe.
- No symptoms at all — many patients have severe AS yet feel fine. Yearly echoes catch the worsening before symptoms.

# When to Act — A Decision Map

| Situation | What We Do |
|---|---|
| Mild AS, no symptoms | Yearly echo and check-in. Treat blood pressure, cholesterol. |
| Moderate AS, no symptoms | Echo every 1–2 years. Review symptoms each visit. |
| Severe AS, no symptoms, normal LVEF | Echo every 6–12 months. Consider stress test. Discuss early intervention if very severe (RECOVERY, AVATAR). |
| Severe AS WITH symptoms | Refer to heart team. Plan TAVR or SAVR within weeks. |
| Very severe AS, even without symptoms | Strongly consider intervention even if asymptomatic — outcomes are better. |



# Treatment Options

- There is no medicine that fixes AS. Statins do not slow it. Blood pressure medicines and treating other heart disease are still important.
- TAVR (Transcatheter Aortic Valve Replacement) — a new valve through a catheter, no chest opening. The most common choice for most patients today.
- SAVR (Surgical Aortic Valve Replacement) — open-heart surgery. Used when TAVR anatomy is unfavorable or other heart surgery is needed at the same time.
- Balloon valvuloplasty — a temporary, palliative option. Restenosis happens within months. Sometimes used as a bridge.
- For complete TAVR detail, see Dr. Ali's TAVR Patient Education Guide (cross-referenced at the back of this guide).

**For full TAVR detail** — procedure day, recovery, risks, valve types — see Dr. Ali's TAVR Patient Education Guide.

# Risks, Benefits, and Alternatives

Every choice in AS — from waiting to operating — has trade-offs. Use the table below to start the shared decision conversation.

| Option | Risks | Benefits | Alternatives |
|---|---|---|---|
| Watchful waiting (mild/moderate AS, no symptoms) | AS will progress; symptoms can appear suddenly. Without surveillance, you may miss the right window. | No procedure risk. Low cost. Most appropriate for early disease. | Earlier echo schedule; intervention if severe AS criteria met. |
| Early intervention (asymptomatic very severe AS) | Procedure risk now in someone feeling fine; leakage, conduction issues, lifelong follow-up. | RECOVERY and AVATAR show better long-term survival vs waiting in selected patients with very severe AS and good function. | Continued watchful waiting with closer monitoring (echo every 3–6 months). |
| TAVR for symptomatic severe AS | Stroke (1–3%), pacemaker (5–15%), paravalvular leak, vascular access issues. See TAVR guide for detail. | Less invasive than SAVR. Quick recovery. Comparable mortality at low risk through 5 years (PARTNER 3, Evolut Low Risk). | SAVR (open surgery), conservative care (poor prognosis if untreated). |
| SAVR for symptomatic severe AS | Sternotomy recovery, atrial fibrillation post-op (~30%), longer hospital stay, bleeding/stroke similar overall to TAVR. | Direct visualization. Decades of durability data. Allows concomitant CABG or other valve work. | TAVR (less invasive), staged procedures. |

# Complications of Untreated or Late-Treated AS

Severe AS that is untreated, or treated too late, has predictable downstream effects on the heart and the rest of the body.

| Issue | What We See | How We Respond |
|---|---|---|
| Heart failure | AS makes the left ventricle work too hard for too long; eventually it weakens or stiffens. | Treat AS itself. Manage volume status, treat hypertension, watch BNP. |
| Atrial fibrillation | Common in advanced AS; sudden heart-rate jumps are poorly tolerated. | Rate or rhythm control. Stroke prevention based on CHA2DS2-VASc score. |
| Sudden death | Most common in symptomatic patients without intervention. Up to 5% per year risk in symptomatic severe AS. | Refer for valve replacement when symptoms appear. |
| Conduction issues | AV block or LBBB from calcium extending into the conduction system. | Pacemaker if needed; relevant before TAVR planning. |
| Endocarditis | Infection of the diseased valve. | Prophylactic antibiotics for high-risk procedures (per guidelines); fevers warrant blood cultures. |
| Bleeding (Heyde syndrome) | GI bleeding from acquired von Willebrand disease in severe AS. | Address with valve replacement; transfusion as needed in the meantime. |

# Common Misconceptions

| Myth | Reality |
|---|---|
| If I have no symptoms, AS does not matter. | AS progresses silently. Yearly echoes catch worsening before symptoms appear and let us plan. |
| Statins will fix or slow AS. | Trials (SEAS, SALTIRE) showed statins do NOT slow AS progression. Take them for cholesterol reasons, not for the valve. |
| AS is a death sentence in older adults. | Modern TAVR has excellent results into the 90s for the right patient. Age alone does not rule out treatment. |
| If my doctor says it is moderate, it cannot become severe quickly. | AS can progress 0.3 $cm^2$ area loss per year or faster. Moderate today can be severe in 3 years. |
| Mechanical valves are always better. | Mechanical valves last longer but require lifelong warfarin. For most older patients, tissue valves (used in TAVR and most SAVRs now) are preferred. |
| Once I have a new valve, I am cured forever. | Tissue valves can wear out over 10–20 years. Repeat valve work (valve-in-valve TAVR) is feasible in most cases. |
| My family doctor's exam will catch AS. | The murmur of AS is easy to miss, especially in heavy patients or with high blood pressure. Echo is the only reliable test. |
| Bicuspid AS only affects young people. | Bicuspid AS shows up earlier (40s–60s) but the valve still wears down with calcium over time. |

# Points to Know

Carry these eight points with you.

- Severe AS is defined by gradient ≥ 40 mm Hg, AVA ≤ 1.0 cm², or jet velocity ≥ 4 m/s.
- Once symptoms start in severe AS, untreated mortality is about 50% in 2 years.
- Yearly echo is the cornerstone of AS surveillance. Bring your reports to every visit.
- Tell us right away about new shortness of breath, chest pressure, or any fainting.
- Statins do not fix AS. Take them for cholesterol; manage AS with surveillance and intervention.
- Most patients today get TAVR. SAVR is reserved for specific anatomic or surgical situations.
- Keep blood pressure controlled. Treat sleep apnea. Stay active within your safe range.
- Bring up AS in any pre-procedure or anesthesia consent — sedation choices change with severe AS.

# When to Call Us — and When to Call 911

If you are not sure, call. We would rather hear from you twice than miss a real problem.

- Sudden chest pressure, severe shortness of breath, or passing out — call 911.
- New or worsening shortness of breath with light activity — call us within 24 hours.
- New chest pressure with exertion — call us within 24 hours.
- New fainting or near-fainting — call us same day; do not drive.
- Sudden weight gain (more than 3 lb overnight), new ankle swelling, or pillow-needing breathing — call us within 24 hours.
- Fever for more than 48 hours, especially after a dental or surgical procedure — call us same day to rule out endocarditis.
- Any new heart rhythm you can feel — flutters, racing, skipped beats — call us within 24 hours.
- Bleeding more than usual (gums, GI, easy bruising) — call us; we may check for Heyde syndrome.

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# Trusted Resources

The links below are the trusted resources Dr. Ali used to write this guide and that he recommends you visit for more information. Each is a clickable link in the digital version and a Short.io tracked URL on the printed version.

- AHA — Heart Valve Problems and Disease — Plain-language overview of valve disease and its treatments.
- Mayo Clinic — Aortic Valve Stenosis — Comprehensive overview with FAQs.
- Cleveland Clinic — Aortic Stenosis — Procedure details and recovery information.
- Bicuspid Aortic Foundation — Patient-led resource for bicuspid valve disease.
- Dr. Ali — TAVR Patient Guide — Companion guide focused entirely on TAVR — read this if your team is considering valve replacement.

# Sources Used to Build This Guide

Every recommendation in this guide is grounded in one or more of the studies, guidelines, or trusted resources below. Short links are tracked so Dr. Ali can see which references patients are reading; nothing personally identifying is captured.


- 2020 ACC/AHA Guideline for the Management of Patients with Valvular Heart Disease (Otto et al., JACC 2021) *[Guideline]*
  Primary US guideline framework for AS severity grading, intervention triggers, and TAVR vs SAVR selection.
  Short link: https://doi.org/10.1016/j.jacc.2020.11.018
- 2021 ESC/EACTS Guidelines for the Management of Valvular Heart Disease (Vahanian et al., Eur Heart J 2022) *[Guideline]*
  European guideline used to triangulate severity definitions and timing of intervention.
  Short link: https://doi.org/10.1093/eurheartj/ehab395
- RECOVERY Trial — Early Surgery vs Conservative Care in Asymptomatic Severe AS (Kang et al., NEJM 2020; PMID 31733181) *[Clinical Trial]*
  Underpins the guide's discussion of early intervention for asymptomatic very severe AS.
  Short link: https://doi.org/10.1056/NEJMoa1912846
- AVATAR Trial — Aortic Valve replAcemenT versus conservative treatment in Asymptomatic seveRe AS (Banovic et al., Circulation 2022; PMID 34882436) *[Clinical Trial]*
  Provides additional evidence for early SAVR in asymptomatic severe AS with normal LVEF and exercise tolerance.
  Short link: https://doi.org/10.1161/CIRCULATIONAHA.121.057639
- PARTNER 3 — TAVR vs SAVR in Low-Risk Patients (Mack et al., NEJM 2019; PMID 30883058) *[Clinical Trial]*
  Cited in the AS treatment-options section as the key low-risk TAVR data; full TAVR detail lives in the TAVR guide.
  Short link: https://doi.org/10.1056/NEJMoa1814052
- Evolut Low Risk Trial — Self-Expanding TAVR vs SAVR (Popma et al., NEJM 2019; PMID 30883053) *[Clinical Trial]*
  Companion low-risk TAVR data alongside PARTNER 3; informs the AS-to-treatment decision pathway.
  Short link: https://doi.org/10.1056/NEJMoa1816885
- Otto CM, Prendergast B. Aortic-Valve Stenosis - From Patients at Risk to Severe Valve Obstruction (NEJM 2014; PMID 25271385) *[Review]*
  Authoritative review used to write the pathophysiology and progression sections.
  Short link: https://doi.org/10.1056/NEJMra1313875
- Rosenhek et al. Predictors of Outcome in Severe Asymptomatic Aortic Stenosis (NEJM 2000; PMID 10944552) *[Original Research]*
  Foundational data on the natural history and progression rate of asymptomatic severe AS.
  Short link: https://doi.org/10.1056/NEJM200008313430903
- Lindman BR et al. Calcific Aortic Stenosis (Nat Rev Dis Primers 2016; PMID 27188578) *[Review]*
  Used for the causes/pathophysiology section, including bicuspid valve and rheumatic etiologies.
  Short link: https://doi.org/10.1038/nrdp.2016.6
- American Heart Association — Heart Valve Problems *[Patient Education]*
  Recommended take-home reading on valve disease in plain language.
  Short link: https://www.heart.org/en/health-topics/heart-valve-problems-and-disease

- Mayo Clinic — Aortic Valve Stenosis *[Patient Education]*
  Cited in the 'Learn More' section for diagnosis and treatment overview.
  Short link: https://www.mayoclinic.org/diseases-conditions/aortic-stenosis

# About This Guide

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**Version:** 2026-08-16
**Reviewer note:** Reviewed against AHA Heart Valve Problems page, Mayo Clinic Aortic Stenosis page, and Cleveland Clinic AS page. Ours adds: explicit severity table with color-coded gradient/AVA bands, asymptomatic-severe trial bridge (RECOVERY, AVATAR), causes covered (calcific, bicuspid, rheumatic), and an explicit decision crosswalk to the TAVR guide.

## Disclaimer

This guide is for educational purposes only and does not replace medical advice from your physician. Recommendations may not apply to every patient. Always follow the specific instructions of Dr. Ali and your care team. In an emergency call 911 or go to the nearest emergency department.

# Take This Guide With You

**Scan or visit:** https://go.riasalimd.com/as-guide
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**Companion:** Dr. Ali's TAVR Patient Guide
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