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CLINICAL PRACTICE GUIDELINE: FULL TEXT

2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Developed in collaboration with and endorsed by the American Association for Thoracic Surgery, American Society of Echocardiography, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Anesthesiologists, and Society of Thoracic Surgeons

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TABLE 13 Stages of AS

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AS	■ BAV (or other congenital valve anomaly) ■ Aortic valve sclerosis	Aortic V_{max} <2 m/s with normal leaflet motion	None	None
B	Progressive AS	■ Mild to moderate leaflet calcification/fibrosis of a bicuspid or trileaflet valve with some reduction in systolic motion or ■ Rheumatic valve changes with commissural fusion	■ Mild AS: aortic V_{max} 2.0–2.9 m/s or mean ΔP <20 mm Hg ■ Moderate AS: aortic V_{max} 3.0–3.9 m/s or mean ΔP 20–39 mm Hg	■ Early LV diastolic dysfunction may be present ■ Normal LVEF	None
C: Asymptomatic severe AS					
C1	Asymptomatic severe AS	Severe leaflet calcification/fibrosis or congenital stenosis with severely reduced leaflet opening	■ Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg ■ AVA typically is ≤1.0 cm^2 (or AVAi 0.6 cm^2/m^2) but not required to define severe AS ■ Very severe AS is an aortic V_{max} ≥5 m/s or mean P ≥60 mm Hg	■ LV diastolic dysfunction ■ Mild LV hypertrophy ■ Normal LVEF	■ None ■ Exercise testing is reasonable to confirm symptom status

D: Symptomatic severe AS

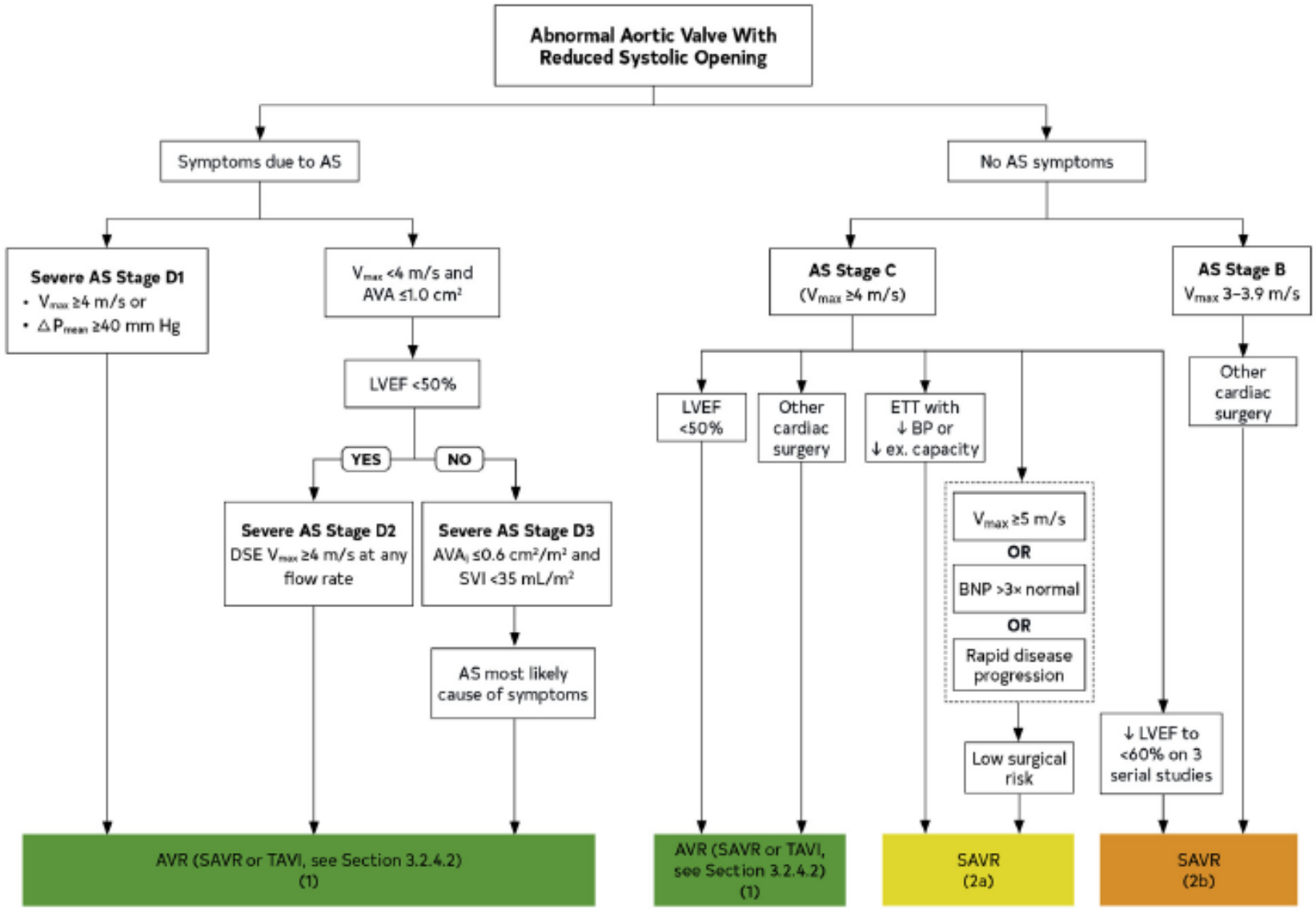
D1	Symptomatic severe high-gradient AS	Severe leaflet calcification/fibrosis or congenital stenosis with severely reduced leaflet opening	■ Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg ■ AVA typically ≤1.0 cm^2 (or AVAi ≤0.6 cm^2/m^2) but may be larger with mixed AS/AR	■ LV diastolic dysfunction ■ LV hypertrophy ■ Pulmonary hypertension may be present	■ Exertional dyspnea, decreased exercise tolerance, or HF ■ Exertional angina ■ Exertional syncope or presyncope
D2	Symptomatic severe low-flow, low-gradient AS with reduced LVEF	Severe leaflet calcification/fibrosis with severely reduced leaflet motion	■ AVA ≤1.0 cm^2 with resting aortic V_{max} <4 m/s or mean ΔP <40 mm Hg ■ Dobutamine stress echocardiography shows AVA <1.0 cm^2 with V_{max} ≥4 m/s at any flow rate	■ LV diastolic dysfunction ■ LV hypertrophy ■ LVEF <50%	■ HF ■ Angina ■ Syncope or presyncope
D3	Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS	Severe leaflet calcification/fibrosis with severely reduced leaflet motion	■ AVA ≤1.0 cm^2 (indexed AVA ≤0.6 cm^2/m^2) with an aortic V_{max} <4 m/s or mean ΔP <40 mm Hg **AND** ■ Stroke volume index <35 mL/m^2 ■ Measured when patient is normotensive (systolic blood pressure <140 mm Hg)	■ Increased LV relative wall thickness ■ Small LV chamber with low stroke volume ■ Restrictive diastolic filling ■ LVEF ≥50%	■ HF ■ Angina ■ Syncope or presyncope

AR indicates aortic regurgitation; AS, aortic stenosis; AVA, aortic valve area circulation; AVAi, AVA indexed to body surface area; BAV, bicuspid aortic valve; ΔP, pressure gradient between the LV and aorta HF, heart failure; LV, left ventricular; LVEF, left ventricular ejection fraction; and V_{max}, maximum velocity.

2a B-NR	3. In patients with suspected low-flow, low-gradient severe AS with reduced LVEF (Stage D2), low-dose dobutamine stress testing with echocardiographic or invasive hemodynamic measurements is reasonable to further define severity and assess contractile reserve (8-10).
2a B-NR	4. In patients with suspected low-flow, low-gradient severe AS with normal or reduced LVEF (Stages D2 and D3), calculation of the ratio of the outflow tract to aortic velocity is reasonable to further define severity (1,11-13).
2a B-NR	5. In patients with suspected low-flow, low-gradient severe AS with normal or reduced LVEF (Stages D2 and D3), measurement of aortic valve calcium score by CT imaging is reasonable to further define severity (14-18).

COR	LOE	RECOMMENDATIONS
1	A	1. In adults with severe high-gradient AS (Stage D1) and symptoms of exertional dyspnea, HF, angina, syncope, or presyncope by history or on exercise testing, AVR is indicated (1–7).
1	B-NR	2. In asymptomatic patients with severe AS and an LVEF <50% (Stage C2), AVR is indicated (8–11).
1	B-NR	3. In asymptomatic patients with severe AS (Stage C1) who are undergoing cardiac surgery for other indications, AVR is indicated (12–16).
1	B-NR	4. In symptomatic patients with low-flow, low-gradient severe AS with reduced LVEF (Stage D2), AVR is recommended (17–24).
1	B-NR	5. In symptomatic patients with low-flow, low-gradient severe AS with normal LVEF (Stage D3), AVR is recommended if AS is the most likely cause of symptoms (25–27).
2a	B-NR	6. In apparently asymptomatic patients with severe AS (Stage C1) and low surgical risk, AVR is reasonable when an exercise test demonstrates decreased exercise tolerance (normalized for age and sex) or a fall in systolic blood pressure of ≥10 mm Hg from baseline to peak exercise (13,28–30).
2a	B-R	7. In asymptomatic patients with very severe AS (defined as an aortic velocity of ≥5 m/s) and low surgical risk, AVR is reasonable (15,31–35).
2a	B-NR	8. In apparently asymptomatic patients with severe AS (Stage C1) and low surgical risk, AVR is reasonable when the serum B-type natriuretic peptide (BNP) level is >3 times normal (32,36–38).
2a	B-NR	9. In asymptomatic patients with high-gradient severe AS (Stage C1) and low surgical risk, AVR is reasonable when serial testing shows an increase in aortic velocity ≥0.3 m/s per year (39,40).
2b	B-NR	10. In asymptomatic patients with severe high-gradient AS (Stage C1) and a progressive decrease in LVEF on at least 3 serial imaging studies to <60%, AVR may be considered (8–11,33).
2b	C-EO	11. In patients with moderate AS (Stage B) who are undergoing cardiac surgery for other indications, AVR may be considered.

FIGURE 2 Timing of intervention for AS



Recommendations for Choice of SAVR Versus TAVI for Patients for Whom a Bioprosthetic AVR Is Appropriate
Referenced studies that support the recommendations are summarized in Online Data Supplement 11 to 13.

COR	LOE	RECOMMENDATIONS
1	A	1. For symptomatic and asymptomatic patients with severe AS and any indication for AVR who are <65 years of age or have a life expectancy >20 years, SAVR is recommended (1-3).
1	A	2. For symptomatic patients with severe AS who are 65 to 80 years of age and have no anatomic contraindication to transfemoral TAVI, either SAVR or transfemoral TAVI is recommended after shared decision-making about the balance between expected patient longevity and valve durability (1,4-8).
1	A	3. For symptomatic patients with severe AS who are >80 years of age or for younger patients with a life expectancy <10 years and no anatomic contraindication to transfemoral TAVI, transfemoral TAVI is recommended in preference to SAVR (1,4-10).
1	B-NR	4. In asymptomatic patients with severe AS and an LVEF <50% who are ≤80 years of age and have no anatomic contraindication to transfemoral TAVI, the decision between TAVI and SAVR should follow the same recommendations as for symptomatic patients in Recommendations 1, 2, and 3 above (1,2,4-10).
1	B-NR	5. For asymptomatic patients with severe AS and an abnormal exercise test, very severe AS, rapid progression, or an elevated BNP (COR 2a indications for AVR), SAVR is recommended in preference to TAVI (1-3,11).

1	A	6. For patients with an indication for AVR for whom a bioprosthetic valve is preferred but valve or vascular anatomy or other factors are not suitable for transfemoral TAVI, SAVR is recommended (1-3,11).
1	A	7. For symptomatic patients of any age with severe AS and a high or prohibitive surgical risk, TAVI is recommended if predicted post-TAVI survival is >12 months with an acceptable quality of life (12,13,14,15).
1	C-EO	8. For symptomatic patients with severe AS for whom predicted post-TAVI or post-SAVR survival is <12 months or for whom minimal improvement in quality of life is expected, palliative care is recommended after shared decision-making, including discussion of patient preferences and values.
2b	C-EO	9. In critically ill patients with severe AS, percutaneous aortic balloon dilation may be considered as a bridge to SAVR or TAVI.

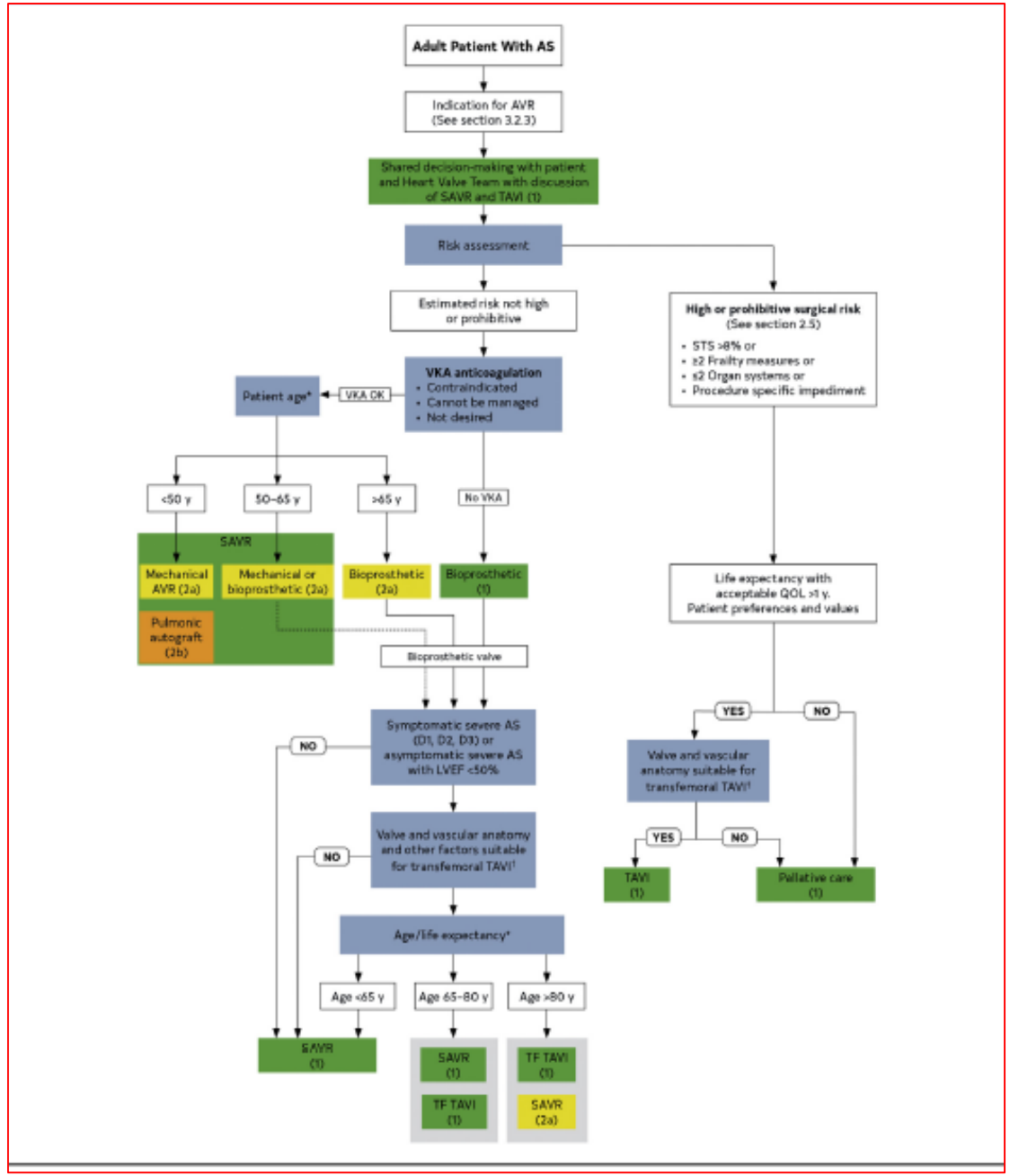

Adult Patient With AS
Indication for AVR (See section 3.2.3)
Shared decision-making with patient and Heart Valve Team with discussion of SAVR and TAVI (1)
Risk assessment
Estimated risk not high or prohibitive
High or prohibitive surgical risk (See section 2.5)
• STS >8% or
• ≥2 Frailty measures or
• ≥2 Organ systems or
• Procedure specific impediment
VKA anticoagulation
• Contraindicated
• Cannot be managed
• Not desired
Patient age*
VKA OK
<50 y
50–65 y
>65 y
No VKA
SAVR
Mechanical AVR (2a)
Mechanical or bioprosthetic (2a)
Pulmonic autograft (2b)
Bioprosthetic (2a)
Bioprosthetic (1)
Bioprosthetic valve
Life expectancy with acceptable QOL >1 y. Patient preferences and values
YES
NO
Valve and vascular anatomy suitable for transfemoral TAVI†
YES
NO
TAVI (1)
Palliative care (1)
Symptomatic severe AS (D1, D2, D3) or asymptomatic severe AS with LVEF <50%
NO
Valve and vascular anatomy and other factors suitable for transfemoral TAVI†
NO
Age/life expectancy*
Age <65 y
Age 65–80 y
Age >80 y
SAVR (1)
SAVR (1)
TF TAVI (1)
TF TAVI (1)
SAVR (2a)

TABLE 14 A Simplified Framework With Examples of Factors Favoring SAVR, TAVI, or Palliation Instead of Aortic Valve Intervention

	Favors SAVR	Favors TAVI	Favors Palliation
Age/life expectancy*	■ Younger age/longer life expectancy	■ Older age/fewer expected remaining years of life	■ Limited life expectancy
Valve anatomy	■ BAV ■ Subaortic (LV outflow tract) calcification ■ Rheumatic valve disease ■ Small or large aortic annulus †	■ Calcific AS of a trileaflet valve	
Prosthetic valve preference	■ Mechanical or surgical bioprosthetic valve preferred ■ Concern for patient-prosthesis mismatch (annular enlargement might be considered)	■ Bioprosthetic valve preferred ■ Favorable ratio of life expectancy to valve durability ■ TAVI provides larger valve area than same size SAVR	
Concurrent cardiac conditions	■ Aortic dilation ‡ ■ Severe primary MR ■ Severe CAD requiring bypass grafting ■ Septal hypertrophy requiring myectomy ■ AF	■ Severe calcification of the ascending aorta ("porcelain" aorta)	■ Irreversible severe LV systolic dysfunction ■ Severe MR attributable to annular calcification
Noncardiac conditions		■ Severe lung, liver, or renal disease ■ Mobility issues (high procedural risk with sternotomy)	■ Symptoms likely attributable to noncardiac conditions ■ Severe dementia ■ Moderate to severe involvement of ≥2 other organ systems
Frailty	■ Not frail or few frailty measures	■ Frailty likely to improve after TAVI	■ Severe frailty unlikely to improve after TAVI
Estimated procedural or surgical risk of SAVR or TAVI	■ SAVR risk low ■ TAVI risk high	■ TAVI risk low to medium ■ SAVR risk high to prohibitive	■ Prohibitive SAVR risk (>15%) or post-TAVI life expectancy <1 y
Procedure-specific impediments	■ Valve anatomy, annular size, or low coronary ostial height precludes TAVI ■ Vascular access does not allow transfemoral TAVI	■ Previous cardiac surgery with at-risk coronary grafts ■ Previous chest irradiation	■ Valve anatomy, annular size, or coronary ostial height precludes TAVI ■ Vascular access does not allow transfemoral TAVI
Goals of Care and patient preferences and values	■ Less uncertainty about valve durability ■ Avoid repeat intervention ■ Lower risk of permanent pacer ■ Life prolongation ■ Symptom relief ■ Improved long-term exercise capacity and QOL ■ Avoid vascular complications ■ Accepts longer hospital stay, pain in recovery period	■ Accepts uncertainty about valve durability and possible repeat intervention ■ Higher risk of permanent pacer ■ Life prolongation ■ Symptom relief ■ Improved exercise capacity and QOL ■ Prefers shorter hospital stay, less postprocedural pain	■ Life prolongation not an important goal ■ Avoid futile or unnecessary diagnostic or therapeutic procedures ■ Avoid procedural stroke risk ■ Avoid possibility of cardiac pacer