

VALVULAR HEART DISEASE

Introduction

Cardiac valve abnormalities can pose a serious risk in the perioperative setting. The ACC/AHA guidelines have identified severe valvular disease as an “Active Cardiac Condition” (ie high risk) for noncardiac surgery. Identifying pathologic murmurs and distinguishing them from functional murmurs by careful history and exam is the first essential step. The type and degree of valvular dysfunction, as well as the nature of the planned surgery all influence perioperative risk, and determine the need for intervention. Abnormalities of the aortic and mitral valves are the most common, and generally pose the most clinically significant risk perioperatively.

Aortic Stenosis

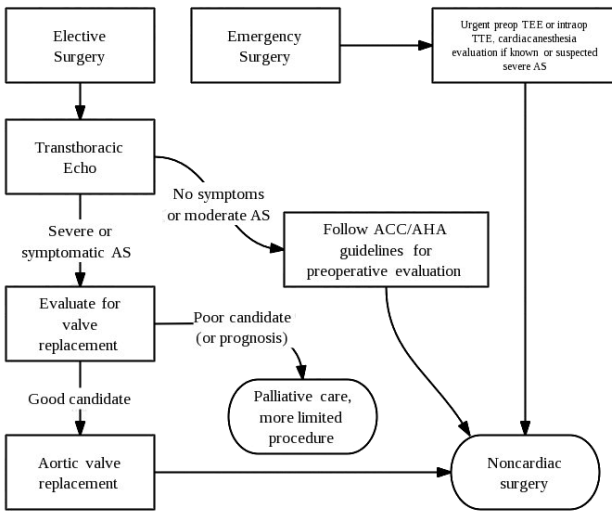
- The most common valvular heart disease in the elderly.
- Severe aortic stenosis poses the “greatest risk for noncardiac surgery” (ACC/AHA guidelines¹). Goldman 1977: 17% risk of cardiac complications and 13% cardiac mortality². More recent studies suggest a 10% overall mortality with severe AS.
- Concomitant coronary disease is present in up to 50% of patients with AS, and carotid disease is more common in AS patients.
- Physical findings: Systolic ejection murmur (right 2nd intercostal space, mid to late peak intensity), a softer than normal S2, and carotid pulse with delayed upstroke.

Echocardiographic Severity

	Aortic jet velocity, m/sec	Mean gradient, mmHg	Valve area, cm ²
Normal	<1.5	<5	3.0-4.0
Mild	<3.0	<25	>1.5
Moderate	3.0-4.0	25-40	1.0-1.5
Severe	>4.0	>40	<1.0

- AS is a progressive disease. The mean annual decrease in valve area is about 0.1 cm², but rapid progression can occur and is not predictable. A reasonable approach would be to obtain an echo within 3 months for asymptomatic patients with known severe disease, 6 – 12 months for moderate disease, 2 years for mild disease, and 2 – 3 years for aortic sclerosis.
- Valve replacement is recommended in symptomatic patients prior to noncardiac surgery. Balloon valvotomy may be considered as a temporizing measure in patients requiring urgent noncardiac surgery, but there is mixed evidence about its efficacy.
- Mortality risk is low in patients with AS who score zero on the Modified Goldman Index.
- One recent retrospective study⁴ evaluated patients with severe aortic stenosis (n=32) who underwent surgical repair for hip fracture. There was no statistical difference in 30-day mortality (6.2 vs. 6.8%) or rate of major cardiac complication (18.7 vs. 11.8%), compared to age-matched controls. It is difficult to draw any major conclusions from this, however, given the low power of the study.
- Perioperative management in asymptomatic patients, after echocardiographic evaluation, should involve close hemodynamic monitoring (up to 48 hours postop), involvement of a cardiac anesthesiologist, exquisite maintenance of intravascular volume, consideration of beta-blockers. Maintaining sinus rhythm and preventing tachycardia, if possible, are also critically important.
- Patients with severe aortic stenosis can have impaired platelet function and decreased levels of von Willebrand factor, which can be associated with clinical bleeding.

Suggested algorithm for patients with known or suspected aortic stenosis.



- Aortic sclerosis without stenosis is not in itself considered an independent perioperative risk factor. However, there is an increased incidence of cardiovascular disease in patients with this condition, and may be a marker for coronary atherosclerosis.
- If there is any uncertainty about a suspicious murmur (or a questionable outside echocardiogram reading, etc.), it is best to order a preoperative echocardiogram.
- If there is further uncertainty regarding the patient's clinical picture or echocardiographic result, do not hesitate to consult cardiology.
- It should be noted that patients with sub-aortic stenosis (i.e., idiopathic hypertrophic sub-aortic stenosis (IHSS)) should be managed like patient's with aortic stenosis (avoid tachycardia, volume depletion)
- Patients should be managed with excellent IV access (e.g., central line). In the event that there is unanticipated bleeding or volume loss, rapid IV resuscitation is essential.
- Avoid the use of nitrates in patients with critical aortic stenosis or IHSS as it reduces filling pressures and may precipitate sudden death.

Mitral Stenosis

- Condition is increasingly rare, but important to recognize.
- Tachycardic states cause a reduction in the diastolic filling period, and can result in severe pulmonary congestion. Rate control is thus beneficial, and the use of medications such as beta-blockers should be considered.
- Physical findings: Low-pitched blowing diastolic murmur, which is best heard with the bell of the stethoscope at the apex. There may also be a loud S1 (if the leaflets remain pliable), a narrowly split S2 with an opening snap after S2. Prominent "a" waves of the jugular venous pulse, a palpable right ventricle heave, and sometimes a flushed facial appearance. Symptoms are nonspecific and typically consist of dyspnea, fatigue, and decreased exercise tolerance.
- Preoperative surgical correction of mitral valve disease is generally not indicated, unless there is a need to do so irrespective of the proposed surgery.
- Balloon valvotomy or open surgical repair prior to high-risk surgery may be beneficial if stenosis is severe.
- Over 50% of individuals with mitral stenosis will develop chronic atrial fibrillation and over 80% will develop paroxysmal atrial fibrillation, and thus patients are at risk for perioperative atrial fibrillation.

Aortic Regurgitation

- Physical findings: Wide pulse pressure with high-pitched, decrescendo, early diastolic murmur along the left sternal border is the classic finding. A mid-diastolic murmur at the apex (Austin-Flint murmur) is caused by the regurgitant stream striking the mitral valve leaflet. An S3 may be present, which warrants concern for LV dysfunction.
- Asymptomatic patients with AR generally tolerate anesthesia and surgery well.
- Symptomatic patients (or asymptomatic patients with significantly reduced LV function) with AR should be considered for valve replacement.
- Perioperative management should include attention to volume control and afterload reduction.
- Unlike mitral stenosis, bradycardia can worsen AR by increasing diastolic time, and thus unusually low heart rates should be avoided.

Mitral Regurgitation

- Most common causes are papillary muscle dysfunction and mitral valve prolapse.
- Physical findings: Apical holosystolic murmur, a third heart sound, and a diastolic flow rumble. Auscultation in the sitting, standing, squatting, and standing-after-squatting positions may identify a tendency to volume or stress-related regurgitation.
- Antibiotic prophylaxis is no longer recommended for patients with mitral valve prolapse—see “**Endocarditis Prophylaxis.**”
- In patients with severe MR undergoing high-risk procedures, preoperative optimization with diuretics, afterload reduction and possibly pulmonary artery pressure monitoring prior to surgery should be considered.

Other Structural Heart Disease

Perioperative considerations in patients with other structural heart conditions, such as congenital cyanotic heart disease, are beyond the scope of this handbook. However, strong consideration should be made for cardiology consultation in such cases.

Prosthetic Heart Valves

There are three main considerations:

- Function of the prosthetic valve: Assess for signs of decreased valve function and if indicated, obtain preoperative echocardiogram.
- Endocarditis prophylaxis: There are fewer indications for endocarditis prophylaxis with the most recent AHA/ACC guidelines—see **Endocarditis Prophylaxis.**
- Management of anticoagulation: Anticoagulation in patients with mechanical or bioprosthetic valves requires careful perioperative planning. See **Anticoagulation.**

References

1. Fleisher LA, Beckman JA, Brown KA, et al. ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation.* 2007;116:e418-e500.
2. Goldman L, Caldera DL, Nussbaum SR, et al. Multifactorial index of cardiac risk in noncardiac surgical procedures. *N Engl J Med.* 1977;297:845-50.
3. Bonow RO, Carabello BA, Chatterjee K, et al. 2008 focused update incorporated into the ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Valvular Heart Disease. *Circulation.* 2008;118:e523-661.
4. Leibowitz D, Rivkin G, Schiffman J, et al. Effect of severe aortic stenosis on the outcome in elderly patients undergoing repair of hip fracture. *Gerontology.* 2009;55:303-306.