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Risk Stratification: Timing of Surgery for Aortic Regurgitation

Ricardo Benenstein, MD, Muhamed Saric, MD, PhD

**INTRODUCTION**

Aortic regurgitation (AR) may lead to serious morbidity and excess mortality. As noted in the preceding chapters, the diagnosis of AR should be based on the guidelines for native valvular regurgitation by the American Society of Echocardiography and other international organizations. The role of medical, percutaneous, and surgical options for the treatment of AR is discussed in this chapter. The recommendations for AR treatment follow the latest joint American Heart Association (AHA) and American College of Cardiology (ACC) valvular heart disease guidelines. Surgery remains the only definitive means of treating AR in appropriate patients.

**MEDICAL THERAPY**

No medical therapy has ever been shown to alter the natural progression or to improve survival in patients with AR. The role of medical therapy is primarily to alleviate the symptoms and to treat associated conditions such as systemic hypertension and heart failure.

**Acute Aortic Regurgitation**

Beta blockers are used in the treatment of AR associated with type A aortic dissection. When acute AR is associated with other causes, beta blockers should be used with caution, if at all, as their use prevents compensatory tachycardia and may lead to hypotension.

**Chronic Aortic Regurgitation**

Systolic hypertension (systolic blood pressure $>140$ mm Hg) in patients with chronic AR should be preferably treated with vasodilators (dihydropyridine calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors, and/or angiotensin receptor blockers). If the left ventricular ejection fraction (LVEF) is diminished, the use of beta blockers, ACE inhibitors, and/or angiotensin receptor blockers is recommended. In contrast, vasodilator therapy has not been shown to be beneficial in asymptomatic patients with chronic AR and normal LVEF.

**PERCUTANEOUS INTERVENTIONAL THERAPY**

**Percutaneous Aortic Valves**

In contrast to aortic stenosis, percutaneously implantable aortic prosthetic valves are not approved for the treatment of native AR at present.

**Intra-aortic Balloon Pump**

The use of intra-aortic pump is contraindicated in patients with AR.

**SURGICAL THERAPY**

In appropriate patients, aortic valve surgery remains the only definitive treatment for AR. Aortic valve replacement is the primary form of surgical therapy for AR. Aortic valve repair (valve-sparing surgery) is feasible in some instances; however, such repair should preferably be done at centers with specialized expertise.

The timing of surgery for AR is dependent on the following five decision points: severity of AR, symptoms, left ventricular (LV) systolic function, LV size, and the need for other cardiac surgery.

**Severity of Aortic Regurgitation**

Surgery is performed typically only for severe AR; moderate AR is treated surgically only when a patient is already undergoing cardiac or aortic surgery for other indications.

**Acute Versus Chronic Aortic Regurgitation**

Severe acute AR is typically a medical emergency requiring prompt surgical intervention. The leading causes of severe acute AR include type A aortic dissection, infective endocarditis, blunt chest trauma, and iatrogenic complications of aortic catheterization. Surgery in acute AR is necessary both to reverse the hemodynamic instability (pulmonary edema, hypotension, low cardiac output) and to provide the definitive therapy for aortic valve pathology, especially in the cases of type A aortic dissection. A number of studies have demonstrated improved survival in patients with severe acute AR who were treated with prompt aortic valve surgery.
The timing of surgical intervention for chronic AR is dependent on symptoms, LV systolic function, and LV size.

**Symptoms**

Clinical presentations of severe AR include angina (even in the presence of angiographically normal coronary arteries), exertional dyspnea, and other signs and symptoms of heart failure. If the nature of symptoms is unclear, exercise testing can be used to objectively assess exercise capacity and symptom status. Symptomatic severe chronic AR is an indication for surgery irrespective of LV size and LV systolic function.  

**LV Systolic Function**

Chronic AR leads to a progressive increase in LV size and a progressive decrease in LV systolic function. In asymptomatic patients with severe chronic AR, surgery is indicated when (1) LVEF is diminished (<50%),1 or (2) LVEF is normal (>50%) but there is LV dilation (LV end-systolic diameter > 50 mm or LV end-diastolic diameter > 65 mm). The evidence for the use of the end-systolic diameter cutoff value2 is stronger than that for the end-diastolic diameter. Symptomatic patients with severe chronic AR should be considered for aortic valve surgery irrespective of LVEF and LV size.

**Need for Other Cardiac Surgery**

It the patient is undergoing cardiac surgery for other indications, AV surgery should be considered in all patients with moderate or severe AR irrespective of symptoms, LVEF, or LV size.

**DECISION ALGORITHMS FOR SURGICAL TREATMENT OF AORTIC REGURGITATION**

**Level of Evidence**

In general, there is a relative paucity of studies evaluating the effectiveness of therapies for AR; therefore no AHA-ACC treatment recommendation has the level of evidence A, the highest level that is based on multiple randomized trials or meta-analyses. The recommendations for AR treatment are based on single randomized trials and nonrandomized studies (level of evidence B) or consensus opinions of experts (level of evidence C).

**Strength of Recommendations**

As with other treatment recommendations, class I indication implies that the treatment should be administered. Class IIa implies that it is reasonable to administer the treatment, whereas IIb implies that the treatment may be considered. Recommendations for AR fall into class I, IIa, and IIb. There are no class III recommendations for AR (treatments that have no proven benefits or are harmful).

**SEVERE ACUTE AORTIC REGURGITATION**

As previously noted, severe acute AR is a medical emergency requiring prompt aortic valve surgery. LVEF as well as LV end-systolic and end-diastolic cutoff values discussed earlier do not apply to severe acute AR, as LVEF and LV size are typically normal if the heart is otherwise healthy.

**SEVERE CHRONIC AORTIC REGURGITATION**

**Class I Indications: AV Surgery Should Be Performed**

- Severe chronic AR in symptomatic patients irrespective of LV size or systolic function [level of evidence B]  
- Severe chronic AR with LV systolic dysfunction (LVEF < 50%) irrespective of symptoms [level of evidence B]  
- Severe chronic AR in patients undergoing cardiac surgery for other indications irrespective of symptoms and LV systolic function [level of evidence C]

**Class IIa Indications: AV Surgery Is a Reasonable Option**

- Asymptomatic severe chronic AR with normal LVEF (>50%) but with severe LV dilation as defined by LV end-systolic diameter greater than 50 mm [level of evidence B]  
- Moderate chronic AR in patients undergoing cardiac surgery for other indications irrespective of symptoms and LV systolic function [level of evidence C]

**Class IIb Indication: AV Surgery May Be Considered**

- Asymptomatic severe chronic AR with normal LVEF (>50%) but with severe LV dilation as defined by LV end-diastolic diameter greater than 65 mm, if surgical risk is low [level of evidence C] (Fig. 106-1)

**Figure 106-1.** Algorithm for surgical treatment of chronic aortic regurgitation (AR). AVR, Aortic valve replacement; LV, left ventricle; LVEF, left ventricular ejection fraction; LVEDD, left ventricular end-diastolic diameter; LVESD, left ventricular end-systolic diameter.
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REFERENCES


