Comprehensive Valve Center

Advancements in evaluation and therapy of valvular heart disease have extended the benefits of treatment to increasing numbers of patients. Patients being evaluated for valve disease are older and more medically complex than in the past. Newer therapies offer the potential of treating patients less invasively and resulting in better outcomes. Selecting the optimal approach for each individual patient requires a collaborative effort between cardiologists, cardiac surgeons, cardiac imaging specialists, and intensivists.

To address this need, the physicians of the Oregon Heart & Vascular Institute have created the Comprehensive Valve Center. The center is a multidisciplinary effort designed to provide the most appropriate and up-to-date care for patients with valve disease, and to create a responsive, seamless, and integrated experience for patients, their families, and referring physicians. The center offers:

- Weekly multidisciplinary case conferences to discuss optimal treatment of complex patients.
- Involvement of primary care physicians through case conferences, phone consultations, or telemedicine.
- Use of evidence-based guidelines for the evaluation, treatment and follow-up of patients with valve disease.
- Automated reminders to patients for clinical follow-up and testing with their primary care physician and the valve center.
- Access to investigational procedures and techniques for patients who are not candidates for conventional therapy.

OBJECTIVE

The following guidelines for the management of patients with aortic and mitral valve disorders are adapted from the American Heart Association, the American College of Cardiology, and Oregon Cardiology PC protocols. This document is not intended as a definitive patient care protocol, but rather as a general explanation of treatment options and possible outcomes for patients with valve disorder. Please consult a certified cardiologist for advice on specific cases.

TARGET AUDIENCE

This patient management guide is designed for primary care physicians, family practice doctors, internists, and other health care professionals who treat and support patients with complex valve issues.
**Aortic Valve Disorders**

**AORTIC STENOSIS**
Aortic stenosis is characterized by abnormal narrowing of the aortic valve opening, which impedes the flow of blood to the heart. Left untreated, symptoms of angina, syncope or heart failure develop and outlook changes dramatically, with average survival of two to three years.

Two-thirds of asymptomatic patients with severe AS will have a significant clinical event within four years, and require aortic valve replacement within five. More than a third of asymptomatic patients with mild AS will develop symptoms within three years.

**ECHOCARDIOGRAM** is recommended if clinical exam detects:
- New 3/6 murmur
- Diminished or absent S2
- Murmur in patients with symptoms (chest pain, dyspnea, syncope or pre-syncope)

**EXERCISE TESTING** is discouraged for all aortic stenosis patients due to safety concerns.

**SERIAL TESTING IN ASYMPTOMATIC PATIENTS:**
- Mild AS: Echo every three to five years
- Moderate AS: Echo every one to two years
- Severe AS: Annual echocardiogram

**TREATMENT OPTIONS:**
- **Medication.** Treat symptoms of heart failure (diuretics are the mainstay). Counter to initial research, statins probably do not prevent disease progression.
- **Aortic valve replacement (AVR).** For the vast majority of adults, AVR is the only effective treatment for severe aortic stenosis.
- **Balloon valvuloplasty.** This method is largely palliative for patients of advanced age and/or with severe co-morbidities. It carries a relatively high stroke risk.
- **Percutaneous valve insertion.** To a large extent, the patient base for this relatively new procedure is similar to that for balloon valvuloplasty (those of advanced age and/or with severe co-morbidities).

**INDICATIONS FOR AORTIC VALVE REPLACEMENT:**
- Symptomatic patients with severe AS
- Patients with moderate or severe AS undergoing coronary artery bypass grafting (CABG) or aortic root surgery
- Patients with severe AS and LVEF <0.50
- Higher-risk asymptomatic patients with severe AS who have a heavy calcium burden on the valve, elevated BNP levels, or coexisting coronary artery disease or left ventricular hypertrophy

**GUIDELINES FOR AVR FOLLOW UP:**
- Three to four week post-operative clinic appointment with scheduled baseline echo and follow-up echo every two to three years
- Chest x-ray and hemoglobin at early follow up, then yearly hemoglobin +/- LDH to assess for hemolysis
- Indefinite use of ASA 81mg per day for all patients post-AVR, regardless of warfarin use

**WHEN TO REFER:** Consider consulting with a cardiologist when treating a patient with moderate to severe aortic stenosis.

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**AVR: KNOW THE RISKS**
Perioperative mortality for AVR is 5.5 to 7 percent when combined with CABG.

For patients older than 65, perioperative mortality for AVR alone is 6 to 8 percent.

Compare to sudden death risk for asymptomatic patients of < 1 percent/year.

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**AORTIC REGURGITATION**
Aortic regurgitation is the leaking of the aortic valve of the heart, which causes blood to flow in the reverse direction during ventricular diastole – from the aorta into the left ventricle. Chronic AR can result in progressive left ventricular chamber enlargement and eventually cause irreversible left ventricular systolic dysfunction, which can persist even after aortic valve replacement. Earlier intervention is, therefore, clinically important.

AR results from either an intrinsic valve abnormality or a dilation of the aortic root. Echocardiogram is quite helpful in discerning the cause.

**ECHOCARDIOGRAM** can be used to:
- Establish a diagnosis and mechanism for AR
- Assess for AR when aortic root is enlarged

**EXERCISE TESTING** may be helpful in identifying symptomatic patients, due to the indolent nature of the disorder.
SERIAL TESTING for severe AR in asymptomatic patients with normal LV systolic function but LV enlargement:
- Echo every six to 12 months if LV mildly enlarged (end diastolic dimension >60mm)
- Echo every four to six months if LV at least moderately enlarged (end diastolic dimension >70mm)

TREATMENT OPTIONS:
- Medical afterload reduction is indicated only in hypertensive patients. (Most recent research suggests medical therapy generally does not retard disease progression.)
- Aortic valve replacement (AVR). For the vast majority of adults, AVR is the only effective treatment for severe aortic regurgitation.

INDICATIONS FOR AORTIC VALVE REPLACEMENT:
- Severe AR in symptomatic patients
- Severe AR in asymptomatic patients with LV dysfunction (LVEF <0.50)
- Severe AR in asymptomatic patients undergoing CABG or aortic root surgery
- Severe AR in asymptomatic patients with normal LVEF but significant LV enlargement (LV end diastolic dimension >75mm or end systolic dimension >55mm)

WHEN TO REFER: Consider consulting with a cardiologist when treating a patient with moderate to severe aortic regurgitation.

BICUSPID AORTIC VALVE
A bicuspid aortic valve (BAV) has only two leaflets instead of the usual three. In many cases, BAV causes no problems. However, BAV can become calcified later in life, which may lead to aortic stenosis that will manifest in murmurs. If the leaflets do not close properly, aortic regurgitation may occur. BAV patients are at higher risk for aortic valve dissection.

SERIAL TESTING:
- Follow indications for aortic stenosis and aortic regurgitation patients
- Annual echo if aortic root is >4.0cm

INDICATIONS FOR AORTIC ROOT REPAIR:
- If AVR is being performed, repair aortic root when >4.5cm
- If no AVR planned, repair aortic root if >5.0cm

TAVI is performed in patients with severe aortic stenosis or regurgitation who are not considered traditional surgical candidates.

It may be performed either retrograde or apically without the need for a surgical sternotomy.
Mitral Valve Disorders

MITRAL STENOSIS

Mitral stenosis is characterized by an abnormal narrowing of the mitral valve opening. The narrow opening impedes the flow of blood to the heart and the left atrium needs a higher pressure to overcome the increased gradient.

The most common cause of mitral stenosis is rheumatic heart disease. Untreated mitral stenosis can lead to pulmonary hypertension, atrial fibrillation, and ultimately, congestive heart failure.

ECHOCARDIOGRAM will show decreased opening of the mitral valve and increased blood flow velocity during diastole in mitral stenosis patients.

EXERCISE TESTING can be helpful in assessing the functional significance of mitral stenosis.

SERIAL TESTING in asymptomatic patients with mild to moderate mitral stenosis:
- Annual physical exam
- Annual chest x-ray
- Annual electrocardiogram
- Echocardiogram should be performed if clinical status changes

TREATMENT OPTIONS:
- Medication. Use of indicated medications such as diuretics, antiarrhythmics, anticoagulants.
- Percutaneous mitral balloon valvotomy (PMBV). This method does not cure the condition or make the valve normal. It helps improve valve function and reduces symptoms associated with mitral stenosis.
- Mitral valve replacement. The damaged heart valve is removed and replaced with a new valve during open heart surgery. Generally the last choice for treatment.

Percutaneous mitral balloon valvotomy is reserved for patients without associated severe mitral regurgitation or severely thickened or highly calcified leaflets or subvalvular apparatus. It is preferred over MVR because it does not involve sternotomy or other surgical risks, and may decrease the need for warfarin.

INDICATIONS FOR PMBV:
- Symptomatic patients with moderate or severe MS
- Asymptomatic patients with moderate or severe MS and pulmonary hypertension

INDICATIONS FOR SURGICAL REPLACEMENT:
- Symptomatic patients with moderate to severe MS where PMBV is contraindicated
- Patients with severe MS and severe pulmonary hypertension who are not candidates for PMBV

GUIDELINES FOR MVR FOLLOW UP:
- Three to four week post-operative clinic appointment with scheduled baseline echo and follow-up echo every two to three years
- Ongoing annual examination for asymptomatic patients
- Short-term anticoagulant therapy, if appropriate

WHEN TO REFER: Consider consulting with a cardiologist when treating a patient with moderate to severe mitral stenosis.

MITRAL REGURGITATION

Mitral regurgitation occurs when the mitral valve does not close properly and blood leaks back into the left atrium. Common causes include mitral valve prolapse, calcific degenerative valve disease, ischemic papillary muscle dysfunction, rheumatic fever, and annular dilation secondary to LV systolic dysfunction and dilations. Prognosis depends on LV function and severity, and duration of MR. Patients with mild, asymptomatic MR may be monitored, but progressive or symptomatic MR requires mitral valve repair or replacement.

ECHOCARDIOGRAM is used to:
- Determine the etiology of the regurgitation
- Determine the severity of the lesion
- Evaluate the amount of regurgitation
- Observe the size and function of the ventricles
- Gauge pulmonary artery pressure

INDICATIONS FOR SURGICAL REPLACEMENT:
- Symptomatic patients with severe MR where PBMV is contraindicated
- Patients with severe MR and severe pulmonary hypertension who are not candidates for PMBV

GUIDELINES FOR MVR FOLLOW UP:
- Three to four week post-operative clinic appointment with scheduled baseline echo and follow-up echo every two to three years
- Ongoing annual examination for asymptomatic patients
- Short-term anticoagulant therapy, if appropriate

WHEN TO REFER: Consider consulting with a cardiologist when treating a patient with moderate to severe mitral regurgitation.
**SERIAL TESTING:**
- For mild MR and otherwise normal heart: Annual exam. Repeat echo only if clinical status or murmur changes.
- For moderate to severe MR: Annual exam and echocardiogram. Perform echo sooner if symptoms develop.

**TREATMENT OPTIONS:**
- Medication. Use of indicated medications such as diuretics, antiarrhythmics, nitrates.
- Mitral valve repair.
- Mitral valve replacement.
- There is no generally accepted medical therapy for asymptomatic patients with chronic MR.

**INDICATIONS FOR MITRAL VALVE REPAIR:**
- Chronic asymptomatic severe MR with normal LV function (EF >60 percent and end systolic dimension <40mm). If mitral valve repair is not possible, continue clinical evaluation and echocardiogram every six months.

**INDICATIONS FOR MITRAL VALVE REPAIR OR REPLACEMENT:**
- Chronic asymptomatic severe MR with normal LV function (EF >60 percent and end systolic dimension <40mm) with new onset atrial fibrillation or pulmonary hypertension.
- Chronic asymptomatic severe MR with LV dysfunction (EF <60 percent and/or end systolic dimension >40mm).
- Chronic symptomatic severe MR with EF >30 percent and/or end systolic dimension <55mm.

**NOTE:** Patients with severe MR and concomitant severe LV dysfunction (EF <30 percent), severe LV enlargement (end systolic dimension of 55 mm), severe pulmonary hypertension, or RV dysfunction have high risk for post-operative complications. Valve repair or replacement surgery should be considered only if sub-valvular apparatus can be preserved at time of surgery. Otherwise, medical management should be considered, possibly in tandem with biventricular pacing.

**WHEN TO REFER:** Consider consulting with a cardiologist when treating a patient with moderate to severe mitral regurgitation.

**MITRAL VALVE REPAIR VS. REPLACEMENT**
Patients who undergo MV repair have shorter hospital stays, lower in-hospital mortality rates, and significantly higher 10-year survival rates compared with MV replacement.

For MV repair patients >60 years or requiring concomitant CABG, outcomes are similar to MV replacement.