Heart Valve Disease and Undertreatment

According to the American Heart Association (AHA) references, approximately five million Americans are diagnosed with heart valve disease yearly.1 Heart valve disease can occur in any single valve or a combination of the four valves, but diseases of the aortic and mitral valves are the most common. Diseased heart valves can become narrowed (stenotic), restricting the one-way flow of blood, and/or leaky (regurgitant), allowing blood that normally flows one-way to flow backward. A variety of conditions can cause heart valves to become narrowed or leaky including degenerative valve disease and calcification associated with aging.

Causes of Heart Valve Disease

Calcification associated with aging is a common cause of valve disease. Accumulation of calcium on the heart valve leaflets (flaps of tissue that open and close to regulate the flow of blood in one direction through the valve) hardens and develops fibrosis which can cause narrowing of the valve opening (stenosis), obstructing proper blood flow through the valve. The aortic valve is the most frequently affected and is typically a disease of the elderly, as a buildup of calcium on heart valve leaflets usually presents itself with advanced age.

Degenerative valve disease is another common cause of heart valve dysfunction. It is a progressive process that represents slow degeneration of the valve leaflets. Over time, the attachments of the valve (chordae tendineae) thin and elongate or rupture, and the leaflets may become larger and redundant which leads to leakage through the valve. Two of the most commonly affected valves are the mitral and tricuspid valve.
**Diagnosis**

Before a patient sees their primary care physician or a cardiologist concerning a heart valve problem, he or she has often experienced symptoms, such as angina (chest pain), tiredness, shortness of breath, lightheadedness or loss of consciousness.

However, in some cases a heart valve problem may cause no symptoms at all. These heart valve issues can often be identified by use of a stethoscope. Heart valve abnormalities, whether stenosis or regurgitation, often produce a heart murmur. A heart murmur, particularly if it is new or loud, should prompt further investigation by a physician. Cardiologists and surgeons will usually obtain an echocardiogram to confirm valvular heart disease.

**Treatment**

Diseased heart valves are typically treated with valve repair or valve replacement through a surgical or transcatheter approach. While medication may temporarily alleviate symptoms, it cannot reverse the unrelenting course of valve dysfunction or stop the progression of the disease. If possible valve repair (preserving native leaflets) is preferred to treat mitral valve regurgitation (MR) and tricuspid valve regurgitation (TR).

**Undertreated Heart Valve Disease**

There is evidence that suggests many patients with severe heart valve disease remain untreated, despite the existence of widely accepted practice guidelines established jointly by the American College of Cardiology (ACC) and the AHA. ACC/AHA guidelines clearly indicate that severe, symptomatic valvular heart disease patients should be evaluated for surgical therapy. While not all patients with severe valve disease are candidates for surgical treatment due to various factors, studies show that many patients who would benefit from surgery to repair or replace their heart valve remain untreated. Many patients may not be treated because they are deemed too high risk for surgical intervention, have not received a definitive diagnosis, or because they delay or decline the procedure.

Medical management can aid in the suppression of symptoms but the progression of the disease continues without intervention. Although treatment consensus seems to exist in literature on symptomatic patients with severe valvular heart disease, it is not uncommon to diverge from the guidelines in clinical practice. This is often the result of an overestimation of operative risk, underestimation of symptoms, and misclassification of hemodynamic severity.13

Research shows that of patients who are medically managed, most are simply not referred for surgical evaluation by a surgeon because operative risk is determined to be too high using conventional risk models.13,14 In accordance with the ACC/AHA guidelines, all patients who meet severe hemodynamic criteria should be evaluated for surgical therapy. A multidisciplinary patient evaluation for surgery should be encouraged in order to more sufficiently assess surgery as a treatment option.13
Aortic Stenosis

Aortic stenosis causes narrowing or obstruction of the aortic valve and is most often due to accumulations of calcium deposits on the valve’s leaflets. This may lead to stenosis, which impairs the valve’s ability to open and close properly. When the leaflets don’t fully open, the heart must work harder to push blood through the narrowed aortic valve. Severe, symptomatic AS patients may develop debilitating symptoms, including angina (chest pain), tiredness, shortness of breath, lightheadedness or loss of consciousness. ACC/AHA and American Society of Echocardiography (ASE) guidelines classify severe aortic stenosis as meeting any one of following parameters measured on an echocardiogram:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic Valve Mean Gradient (mm Hg)</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>Aortic Jet Velocity (m/s)</td>
<td>&gt; 4.0</td>
</tr>
<tr>
<td>Aortic Valve Area (cm²)</td>
<td>&lt; 1.0</td>
</tr>
</tbody>
</table>

Patients who do not undergo aortic valve replacement (AVR) have no effective, long-term treatment option to prevent or delay their disease progression. Without it, symptomatic AS is life threatening and studies indicate that survival after the onset of symptoms is 50% at 2 years and 20% at 5 years.¹⁶

Mitral Valve Regurgitation

Mitral valve regurgitation (MR) occurs when improperly moving leaflets allow blood to flow backward in the opposite direction through the valve. MR is the most frequent form of heart valve disease in the U.S., and prevalence of the disease increases with age.¹⁷ ACC/AHA and ASE guidelines classify severe mitral regurgitation as meeting any one of following quantitative parameters measured on an echocardiogram:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regurgitant Volume (mL/beat)</td>
<td>≥ 60</td>
</tr>
<tr>
<td>Regurgitant Fraction (%)</td>
<td>≥ 50</td>
</tr>
<tr>
<td>Regurgitant Orifice Area (cm²)</td>
<td>≥ 0.40</td>
</tr>
</tbody>
</table>

While ACC/AHA practice guidelines on heart valve disease recommend surgical intervention in adult patients with significant MR and preserved left ventricular function, many remain untreated despite the risks associated with no intervention. Studies show that only one in 40 patients with moderate or severe MR is surgically treated.
Tricuspid Valve Regurgitation

Tricuspid valve regurgitation (TR) refers to the inability of the tricuspid valve leaflets to close properly when the heart contracts during systole, allowing blood to flow backward. Surgical repair with an annuloplasty repair ring is typically recommended for patients with enlargement of the valve opening (annulus), and recent studies support a proactive approach to surgical intervention at the time of mitral valve surgery. ASE guidelines classify severe tricuspid regurgitation as meeting any one of following quantitative parameters measured on an echocardiogram:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet Area – Central Jets (cm²)</td>
<td>&gt; 10</td>
</tr>
<tr>
<td>Vena Contracta Width (cm)</td>
<td>&gt; 0.7</td>
</tr>
<tr>
<td>Proximal Isovelocity Surface Area Radius (cm)</td>
<td>&gt; 0.9</td>
</tr>
</tbody>
</table>

The tricuspid valve is integrally linked to the mitral valve and an improperly functioning mitral valve may adversely affect the normal function of the tricuspid valve. Despite guidelines and recent data that support a proactive approach to surgical intervention at the time of mitral valve surgery, tricuspid valve repair is currently underutilized.

References
20. MountainView Hospital, Las Vegas, NV. Echocardiographic Assessment and Notification of Severe Valvular Regurgitation and Stenosis. Policy EC 02

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