

## Chapter 8

# Valvular Heart Disease

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### ABSTRACT

*Valvular heart disease is a common cardiovascular disorder, with an estimated prevalence of 2.5% in the United States. The disease is particularly burdensome in adults over 75 years of age, with 13.3% having moderate to severe disease of the aortic or mitral valve. As populations grow older, diagnostic capabilities improve, and health care becomes more accessible, the number of patients with valvular heart disease undergoing both cardiac and non-cardiac surgery will continue to grow. The preoperative assessment and optimization of these patients is a complex task involving multiple specialists, including internists, cardiologists, intensivists, cardiothoracic surgeons, and anesthesiologists. As newer therapeutic options are offered to patients with numerous comorbidities, the preoperative management of these patients will require a sophisticated multimodal approach. The purpose of this chapter is to summarize the preoperative assessment and optimization of patients with valvular heart disease undergoing cardiac and non-cardiac surgery.*

### INTRODUCTION

The modern cardiothoracic intensive care unit is a dynamic place. As the scope of cardiothoracic surgery has expanded over the last century, specialists with a specific understanding of complex cardiac anatomy, physiology, and cardiovascular imaging have been needed to manage these patients perioperatively. With the arrival of endovascular approaches to the treatment of major vascular and cardiac pathology, the patient populations served in these intensive care units have changed dramatically. These technological advances have allowed higher-risk and elderly patients to undergo procedures they otherwise would not be candidates for via traditional open approaches.

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## Valvular Heart Disease

Over the last decade, the population characteristics of cardiothoracic patients and the landscape of cardiac procedures have changed. For example, a Canadian study by Buth et al. reviewed all adult patients undergoing cardiac surgery at a single cardiothoracic surgical center between 2001 and 2010. Over the study period, annual case volume decreased by 13%, with a drop in isolated CABG rates, an increase in isolated valve procedures, and an increase in other cardiac procedures including combined valvular and non-CABG procedures, open aortic surgery, and ventricular assist device insertion (Buth, Gainer, Legare, & Hirsch, 2014). Valvular surgery is a growing field, and a thorough understanding of structural anatomy, hemodynamic perturbations, and co-morbidities must be understood to manage these complex patients.

## BACKGROUND

The preoperative assessment of patients with valvular heart disease is vital to anesthetic and surgical planning. General principles include a thorough evaluation of the severity of valvular disease, the degree of impaired myocardial function, and associated comorbidities. The preoperative assessment should start with a thorough history and physical. The history should focus on functional capacity, cardiac reserve, symptoms of congestive heart failure, and symptoms of coronary ischemia. On physical exam, congestive heart failure is evidenced by jugular venous distension, peripheral edema, third and fourth heart sounds, crackles, and rales. Every patient should receive an electrocardiogram (EKG) and chest radiograph (CXR) as part of the preoperative workup. A complete transthoracic echocardiogram (TTE) is indicated in all patients with suspected valvular disease, and periodic repeat studies are indicated at intervals dependent on the type and severity of valvular disease. Based on findings in the aforementioned tests, advanced testing can be performed, which may include transesophageal echocardiography (TEE), three dimensional echocardiography, cardiac catheterization, stress testing, cardiac magnetic resonance imaging (CMR), and computed tomography (CT).

In 2014 the ACC/AHA published a new classification system for valvular heart disease (VHD). This new system is similar to the staging system for heart failure that was published by the AHA/ACC in 2013, and is based upon four stages of disease progression. Table 1 describes these four stages (Nishimura et al., 2014).

*Table 1. Stages of Progression of VHD*

Stage	Definition	Description
A	At risk	Patients with risk factors for development of VHD
B	Progressive	Patients with progressive VHD (mild-to-moderate severity and asymptomatic)
C	Asymptomatic severe	Asymptomatic patients who have the criteria for severe VHD: C1: Asymptomatic patients with severe VHD in whom the left or right ventricle remains compensated C2: Asymptomatic patients with severe VHD, with decompensation of the left or right ventricle
D	Symptomatic severe	Patients who have developed symptoms as a result of VHD

Table taken from 2014 ACC/AHA Valvular Heart Disease Guidelines (Nishimura et al., 2014).

VHD indicates valvular heart disease.

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