Surgical Management of Endocarditis: The Society of Thoracic Surgeons Clinical Practice Guideline

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Executive Summary

In spite of the evolution of antimicrobial therapy and sepsis prevention, infections affecting the heart and the valves continue to create significant morbidity and mortality, leading to valvular incompetence, embolization, cerebrovascular accidents and congestive heart failure. Based upon a review of the literature from January 2000 to December 2010, this guideline focusing on the management of endocarditis in common and complex clinical situations includes recommendations regarding the management of native and prosthetic valve infections, septic neurologic manifestations, and reviews the valve selection options and replacement criteria.

Neurologic complications in patients with endocarditis are among the most vexing and challenging clinical problems to manage. Radiographic evaluation of patients with endocarditis and stroke is recommended using either magnetic resonance imaging or computed tomography scan as an acceptable initial brain imaging study (Class I, Level of evidence B). Vascular imaging should be performed contemporaneously with brain imaging using either magnetic resonance angiography or computed tomography angiography to rule out mycotic aneurysm in patients without evidence intracranial hemorrhage (Class I, Level of evidence C). It is reasonable to reserve catheter angiography for patients with evidence of intracranial bleeding or in circumstances where mycotic aneurysm has been suggested by noninvasive vascular imaging (Class IIa, Level of evidence C).

The timing of surgery in patients with neurologic complications is similarly challenging in patients who have had a major ischemic stroke or any intracranial hemorrhage. It is reasonable to delay valve replacement or repair surgery for at least 4 weeks from the time of the stroke if possible (Class IIa, Level of evidence C). If there is a progressive decline in cardiac function, or congestive heart failure, recurrent stroke, or systemic embolization or uncontrolled infection despite adequate antibiotic therapy, a delay of less than 4 weeks may be reasonable particularly in patients with small areas of brain infarction (Class IIb, Level of evidence C). Recent reports of earlier surgical intervention suggest that surgery may be appropriate without compromising neurologic recovery postoperatively.

When surgery is indicated for native aortic valve endocarditis, a mechanical or stented tissue valve is acceptable, if the infection is limited to the native aortic valve or to the aortic annulus. Valve choice should be based upon age, life expectancy, comorbidities, and compliance with anticoagulation therapy (Class IIa, Level of evidence B). A homograft may be considered in native aortic valve endocarditis when the infection is limited to the native aortic valve or to the aortic annulus (Class IIb, Level of evidence B). This may be particularly true for intravenous drug users when the risk of reoperation is higher due to the higher risk of recurrent endocarditis and a higher rate of structural valve degeneration if bioprosthetic valves are used in younger patients. It may be reasonable to use the homograft in native aortic valve endocarditis with periannular abscess and extensive annular or aortic wall destruction requiring aortic root replacement or reconstruction or extensive aortic ventricular discontinuity (Class IIb, Level of evidence B). When surgery is indicated for prosthetic valve aortic endocarditis, it is reasonable to implant a mechanical or stented tissue valve (Class IIa, Level of evidence B). A homograft may be beneficial in aortic valve prosthetic endocarditis when

REPORT

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Abbreviations and Acronyms

ACC = American College of Cardiology
AHA = American Heart Association
CT = computed tomography
CTA = computed tomography angiography
IE = infectious endocarditis
MA = mycotic aneurysm
MRA = magnetic resonance angiography
MRI = magnetic resonance imaging
MVR = mitral valve replacement
PVE = prosthetic valve endocarditis

periannular abscess or extensive destruction of anatomic structures has occurred (Class IIa, Level of evidence B).

When technically feasible in native mitral valve endocarditis, mitral valve repair is recommended to treat native mitral valve endocarditis (Class I, Level of evidence B). When surgery is indicated and repair cannot be accomplished, mechanical or stented tissue valves can be useful for mitral valve replacement as appropriate given age, life expectancy and comorbidities (Class IIa, Level of evidence B). When surgery is indicated in prosthetic mitral valve endocarditis, either mechanical or stented tissue valves may be considered for valve replacement (Class IIb, Level of evidence C).

When surgery is indicated for native tricuspid valve endocarditis, tricuspid valve repair is recommended for these cases (Class I, Level of evidence B). Mechanical or stented tissue valves can be useful in native valve endocarditis in the tricuspid position when the valve cannot be repaired (Class IIa, Level of evidence C).

In the presence of multiple valve endocarditis involving the aortic valve, the decision to use a homograft for the aortic valve should follow the same outline for isolated aortic valve endocarditis (Class I, Level of evidence C). In the presence of concomitant aortic or mitral or tricuspid valve endocarditis, either a stented tissue or mechanical valve may be implanted in the aortic, mitral, and tricuspid positions. The choice of valve should follow the same algorithm outlined independently for aortic, mitral, and tricuspid valve endocarditis (Class I, Level of evidence B). When surgery of the mitral and tricuspid valves is indicated in multiple valve endocarditis, it can be beneficial to perform mitral and tricuspid valve repair whenever feasible (Class IIa, Level of evidence B).

In spite of the evolution of antimicrobial therapy and sepsis prevention, infections affecting the heart and valves continue to create significant morbidity and mortality, leading to valvular incompetence, embolization, cerebrovascular accidents and congestive heart failure.

This guideline will focus on the management of endocarditis in common and complex clinical situations including native and prosthetic valve infections, septic neurologic manifestations, and review valve selection options and replacement criteria.

In a 2006 practice guideline on the management of valvular heart disease, an American College of Cardiology/American Heart Association (ACC/AHA) committee reviewed management of infectious endocarditis (IE) [1] and developed a number of recommendations based on proposed modified Duke criteria definitions of IE [2]. In the ACC/AHA document, diagnostic criteria, antimicrobial therapy, the use of transesophageal echocardiography and surgery for native and prosthetic valve endocarditis were addressed with level B and C evidence.

The classification system used in this guideline to summarize recommendations is used by the ACC and AHA [3] (Appendix 1). Each recommendation is scored for its efficacy and the strength of the evidence upon which it is based. A MEDLINE search for literature from January 2000 to December 2010 was completed. The keywords searched were as follows: "infective endocarditis," "aortic valve surgery," "mitral valve surgery," "mitral valve repair," "tricuspid valve surgery," "tricuspid valve repair," "treatment," "extensive infective endocarditis," "periannular abscess," "complex infective endocarditis," "periannular endocarditis," "valve replacement," "valve repair," "valve surgery", "native valve endocarditis," "prosthetic valve endocarditis," "right-sided endocarditis," "left-sided endocarditis," and all combinations. A manual search was also performed in nine cardiology and cardiothoracic journals.

I) Neurologic Complications in Endocarditis

A) Radiographic evaluation of patients with stroke and endocarditis

1. **Brain imaging is required if there is suspicion of stroke in the setting of endocarditis. Either magnetic resonance imaging (MRI) or computed tomography (CT) is an acceptable initial study. (Class I, Level of evidence B)**
2. **If MRI is chosen, diffusion weighted imaging, FLAIR imaging, gradient echo imaging, and a postcontrast study, should be performed. (Class I, Level of evidence B)**
3. **If MRI is not feasible, CT should be performed. (Class I, Level of evidence B)**
4. **Vascular imaging should be performed contemporaneously with brain imaging. Magnetic resonance angiography (MRA) and computed tomography angiography (CTA) are both acceptable vascular imaging modalities to screen for mycotic aneurysm in patients without evidence of intracranial hemorrhage. (Class I, Level of evidence C)**
5. **It is reasonable to reserve catheter angiography for patients with evidence of intracranial bleeding, or noninvasive vascular imaging suggestive of mycotic aneurysm. (Class IIa, Level of evidence C)**

The goals of brain imaging in patients with stroke and IE are to determine the location and extent of cerebral infarction, to rule out other complications of septic brain embolism (mycotic aneurysm [MA] and brain abscess),