

Table 12-9 Diagnostic Criteria for Infective Endocarditis*

Pathologic Criteria	
Microorganisms, demonstrated by culture or histologic examination, in a vegetation, embolus from a vegetation, or intracardiac abscess	Histologic confirmation of active endocarditis in vegetation or intracardiac abscess
Clinical Criteria	
Major	
Blood culture(s) positive for a characteristic organism or persistently positive for an unusual organism	Echocardiographic identification of a valve-related or implant-related mass or abscess, or partial separation of artificial valve
New valvular regurgitation	
Minor	
Predisposing heart lesion or intravenous drug use	
Fever	
Vascular lesions, including arterial petechiae, subungual/splinter hemorrhages, emboli, septic infarcts, mycotic aneurysm, intracranial hemorrhage, Janeway lesions [†]	
Immunological phenomena, including glomerulonephritis, Osler nodes, [‡] Roth spots, [§] rheumatoid factor	
Microbiologic evidence, including a single culture positive for an unusual organism	
Echocardiographic findings consistent with but not diagnostic of endocarditis, including worsening or changing of a preexistent murmur	

*Diagnosis by these guidelines, often called the Duke Criteria, requires either pathologic or clinical criteria; if clinical criteria are used, 2 major, 1 major + 3 minor, or 5 minor criteria are required for diagnosis.

[†]Janeway lesions are small erythematous or hemorrhagic, macular, nontender lesions on the palms and soles and are the consequence of septic embolic events.

[‡]Osler nodes are small, tender subcutaneous nodules that develop in the pulp of the digits or occasionally more proximally in the fingers and persist for hours to several days.

[§]Roth spots are oval retinal hemorrhages with pale centers.

Modified from Durack DT, et al: New criteria for diagnosis of infective endocarditis: utilization of specific echocardiographic findings. *Am J Med*, 96:200, 1994, and Karchmer AW: Infective Endocarditis. In Braunwald E, Zipes DP, Libby P (eds): *Heart Disease. A Textbook of Cardiovascular Medicine*, 6th ed. Philadelphia, WB Saunders, 2001, p 1723.

weight, and a fluke syndrome. Murmurs are present in 90% of patients with left-sided IE, either from a new valvular defect or from a preexisting abnormality. The so-called modified Duke criteria (Table 12-9) facilitate evaluation of individuals with suspected IE that takes into account predisposing factors, physical findings, blood

culture results, echocardiographic findings, and laboratory information.

Complications of IE generally begin within the first few weeks of onset, and can include glomerular antigen-antibody complex deposition causing glomerulonephritis (Chapter 20). Earlier diagnosis and effective treatment has nearly eliminated some previously common clinical manifestations of long-standing IE—for example, microthromboemboli (manifest as splinter or subungual hemorrhages), erythematous or hemorrhagic nontender lesions on the palms or soles (Janeway lesions), subcutaneous nodules in the pulp of the digits (Osler nodes), and retinal hemorrhages in the eyes (Roth spots).

Noninfected Vegetations

Noninfected (sterile) vegetations occur in nonbacterial thrombotic endocarditis and the endocarditis of systemic lupus erythematosus (SLE), called Libman-Sacks endocarditis (see later).

Nonbacterial Thrombotic Endocarditis

Nonbacterial thrombotic endocarditis (NBTE) is characterized by the deposition of small sterile thrombi on the leaflets of the cardiac valves (Figs. 12-24 and 12-26). The lesions are 1 to 5 mm in size, and occur as single or multiple vegetations along the line of closure of the leaflets or cusps. Histologically, they comprise bland thrombi that are loosely attached to the underlying valve; the vegetations are not invasive and do not elicit any inflammatory reaction. Thus, although the local effect of the vegetations is usually trivial, they can be the source of systemic emboli that produce significant infarcts in the brain, heart, or elsewhere.

NBTE is often encountered in debilitated patients, such as those with cancer or sepsis—hence the previous term *marantic endocarditis* (root word *marasmus*, relating to malnutrition). It frequently occurs concomitantly with deep venous thromboses, pulmonary emboli, or other findings suggesting an underlying systemic hypercoagulable state (Chapter 4). Indeed, there is a striking association with mucinous adenocarcinomas, potentially relating to the procoagulant effects of tumor-derived mucin or tissue

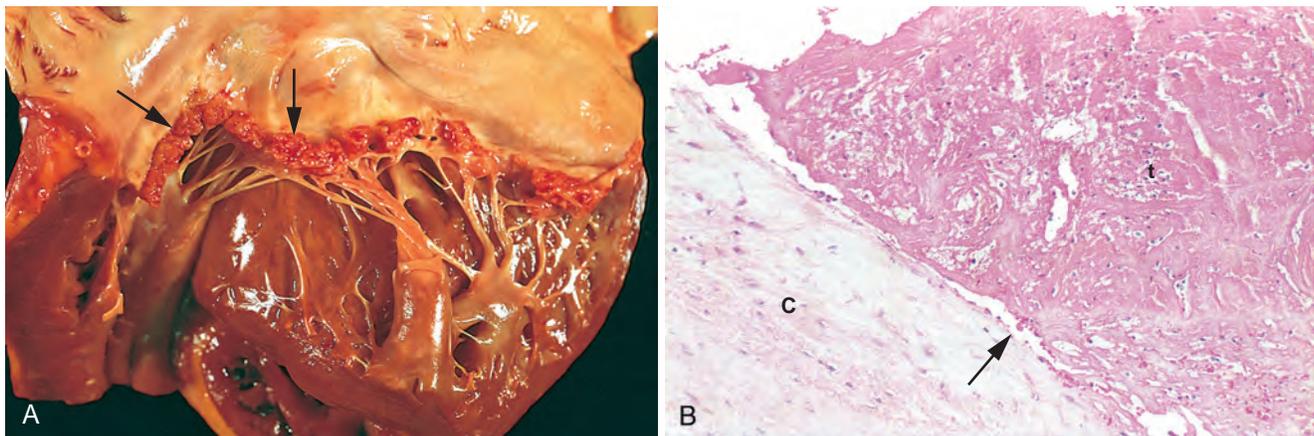


Figure 12-26 Nonbacterial thrombotic endocarditis (NBTE). **A**, Nearly complete row of thrombotic vegetations along the line of closure of the mitral valve leaflets (arrows). **B**, Photomicrograph of NBTE, showing bland thrombus, with virtually no inflammation in the valve cusp (c) or the thrombotic deposit (t). The thrombus is only loosely attached to the cusp (arrow).