

involvement. There is an increased incidence of IE in children without cardiac abnormalities, likely related to the increased use of indwelling central lines to treat other serious diseases ([Bragg and Alvarez, 2014](#)).

Pathophysiology

Organisms may enter the bloodstream from any site of localized infection. Endocarditis may occur from routine exposure to bacteremia associated with usual daily activities such as brushing teeth although it can also occur after procedures such as dental work, invasive procedures involving the gastrointestinal and genitourinary tracts, cardiac surgery, especially if synthetic material is used (valves, patches, conduits); or from long-term indwelling catheters. The most common causative agents are *Staphylococcus aureus* and *Streptococcus viridans*; other causative agents include gram-negative bacteria and fungi such as *Candida albicans*. The microorganisms grow on the endocardium, forming vegetations (verrucae), deposits of fibrin, and platelet thrombi. The lesion may invade adjacent tissues, such as the aortic and mitral valves, and may break off and embolize elsewhere, especially in the spleen, kidney, and CNS.

Diagnostic Evaluation

The diagnosis of IE is suspected on the basis of clinical manifestations ([Box 23-8](#)). The most commonly used diagnostic guidelines are the revised Duke criteria, which outline major and minor criteria consistent with IE ([Li, Sexton, Mick, et al, 2000](#)). Definitive diagnosis rests on growth and identification of the causative agent in the blood. At least three blood cultures are drawn at different times to aid in diagnosis. Vegetations on the valve and abnormal valve function can often be visualized by echocardiography. A diagnosis of culture-negative IE is made when the patient has echocardiographic or clinical evidence of IE but no organism can be cultured. Several laboratory findings may suggest IE including anemia, elevated erythrocyte sedimentation rate [ESR], leukocytosis, and microscopic hematuria.

Box 23-8