



FIGURE 4-6 A, Left bundle branch block (LBBB). B, Right bundle branch block (RBBB). Criteria for bundle branch blocks are summarized in Table 4-2.

instances, the physician must determine the significance of the abnormalities based on clinical findings. Several excellent websites containing examples of normal and abnormal ECGs are available.

LONG-TERM AMBULATORY ELECTROCARDIOGRAPHIC RECORDING

An ambulatory ECG (i.e., Holter monitoring) is a widely used, noninvasive method to evaluate cardiac arrhythmias and conduction disturbances over an extended period and to detect electrical abnormalities that may be brief or transient. With this approach, ECG data from two to three surface leads are stored on a tape recorder that the patient wears for at least 24 to 48 hours. The recorders have patient-activated event markers and time markers so that any abnormalities can be correlated with the patient's symptoms or time of day. These data can then be printed in a standard, real-time ECG format for review.

For patients with intermittent or rare symptoms, an event recorder, which can be worn for several weeks, may be helpful in identifying the arrhythmia. The simplest device is a small, handheld monitor that is applied to the chest wall when symptoms occur. The ECG data are recorded and can be transmitted later by telephone to a monitoring center for analysis. A more sophisticated system uses a wrist recorder that allows continuous-loop

storage of 4 to 5 minutes of ECG data from one lead. When the patient activates the system, ECG data preceding the event and for 1 to 2 minutes after the event are recorded and stored for further analysis. With both devices, the patient must be physically able to activate the recorder during the episode to store the ECG data. Implantable (subcutaneous) recording devices are sometimes used to diagnose infrequent events over extended periods (i.e., months).

Stress Testing

Stress testing is an important noninvasive tool for evaluating patients with known or suggested coronary artery disease (CAD). During exercise, the increased demand for oxygen by the working skeletal muscles is met by increases in heart rate and cardiac output. In patients with significant CAD, the increase in myocardial oxygen demand cannot be met by an increase in coronary blood flow, and myocardial ischemia may produce chest pain and characteristic ECG abnormalities. Combined with the hemodynamic response to exercise, these changes can give useful diagnostic and prognostic information for the patient with cardiac abnormalities. The most common indications for stress testing include establishing a diagnosis of CAD in patients with chest pain, assessing prognosis and functional capacity of patients with chronic stable angina or after an MI, evaluating exercise-induced