



FIGURE 4-5 **A**, Left ventricular hypertrophy as seen on an electrocardiographic recording. Characteristic findings include increased QRS voltage in precordial leads (i.e., deep S in lead V_2 and tall R in lead V_5) and downsloping ST depression and T-wave inversion in lateral precordial leads (i.e., strain pattern) and leftward axis. **B**, Right ventricular hypertrophy with tall R wave in right precordial leads, downsloping ST depression in precordial leads (i.e., RV strain), right axis deviation, and evidence of right atrial enlargement.

and right axis deviation (see Fig. 4-5B). In patients with chronically elevated pulmonary pressures, such as with chronic lung disease, a combination of ECG abnormalities reflecting a right-sided pathologic condition may be identified and include right atrial abnormality, right ventricular hypertrophy, and right axis deviation. In patients with acute pulmonary embolus, ECG changes may suggest right ventricular strain and include right axis deviation; incomplete or complete right bundle branch block (RBBB); S waves in leads I, II, and III; and T-wave inversions in leads V_1 through V_3 .

Interventricular Conduction Delays

The ventricular conduction system consists of two main branches, the right and left bundles. The left bundle further divides into the anterior and posterior fascicles. Conduction block can occur in either of the major branches or in the fascicles (Table 4-2).

Fascicular block results in a change in the sequence of ventricular activation but does not prolong overall conduction time (i.e., QRS duration remains <0.10 second). Left anterior fascicular block is a relatively common ECG abnormality and is sometimes associated with RBBB. This conduction abnormality is identified when extreme left axis deviation occurs (i.e., more

negative than -45 degrees), when the R wave is greater than the Q wave in leads I and aVL, and when the S wave is greater than the R wave in leads II, III, and aVF. Left posterior fascicular block is uncommon but is associated with right axis deviation (>90 degrees); small Q waves in leads II, III, and aVF; and small R waves in leads I and aVL. The ECG findings associated with fascicular blocks can be confused with myocardial infarction (MI). For example, with left anterior fascicular block, the prominent QS deflection in leads V_1 and V_2 can mimic an anteroseptal MI, and the rS deflection in leads II, III, and aVF can be confused with an inferior MI. Similarly, the rS deflection in leads I and aVL in left posterior fascicular block may be confused with a high lateral infarct. Abnormal ST- and T-wave segments and pathologic Q waves (see [Myocardial Ischemia and Infarction](#)) are helpful findings for differentiating MI from a fascicular block.

Bundle branch blocks are associated with a QRS duration longer than 120 milliseconds. In left bundle branch block (LBBB), depolarization proceeds down the right bundle, across the interventricular septum from right to left, and then to the left ventricle. Characteristic electrocardiographic findings include a wide QRS complex; a broad R wave in leads I, aVL, V_5 , and V_6 ; a deep QS wave in leads V_1 and V_2 ; and ST depression and