



**FIGURE 9-4** Heart block. **A**, First-degree atrioventricular (AV) block is associated with 1:1 conduction but a prolonged PR interval more than 200 milliseconds. **B**, Mobitz type I (Wenckebach) second-degree AV block. Notice the progressive PR prolongation preceding the blocked P wave (arrows) followed by recovery of conduction with a shorter PR interval before repetition of the same pattern. **C**, Mobitz type II second-degree AV block. Notice that the PR interval does not prolong in the beat preceding the blocked P wave (arrows). **D**, A 2:1 second-degree AV block. Notice that every other P wave fails to conduct. Because there are never two consecutively conducted P waves to assess for the presence or absence of progressive prolongation, this type of block is neither Mobitz I nor Mobitz II. **E**, Complete heart block with a junctional escape rhythm. Notice that the atrial rate is faster than the ventricular rate and that there is AV dissociation. The narrow QRS escape rhythm implies a level of block high in the conduction system near the AV node.

Because of the profound difference in natural history of second-degree AV block at the AV node and that at an infranodal level, the major clinical task in evaluating patients with second-degree AV block is to establish the probable level of the block. The surface ECG and pattern of block are quite useful.

### Mobitz Type I Second-Degree Atrioventricular Block

Also referred to a Wenckebach block, *Mobitz type I second-degree AV block* is a progressive prolongation in the PR interval before development of AV block, usually for one cycle followed by recovery of conduction with a return to the baseline PR interval (see Fig. 9-4B). Because the degree of prolongation of the PR interval is less with each successive beat before the block, the RR intervals can paradoxically shorten in the final beats before the block.

Mobitz I AV block typically is associated with block at the level of the AV node. However, this pattern is rarely seen with advanced infranodal disease in the His bundle and bundle branches. Because Mobitz type I AV block usually occurs at the level of the AV node, infranodal conduction is commonly normal and associated with a narrow conducted QRS complex. In ambiguous cases, other clues may be helpful. Because AV node function is improved with exercise, Mobitz I block tends to normalize with activity and return at rest. Second-degree block at the level of the AV node is improved with atropine and exacerbated by carotid sinus massage. If associated with periods of complete heart block,

a block at the level of the AV node is associated with a junctional escape with a QRS morphology similar to that in conducted sinus rhythm. In contrast, the observation of a wide complex escape that is different from the conducted QRS points to infranodal causes of block in the His-Purkinje system. The block may be malignant (discussed later) and require expeditious use of ventricular pacing to prevent catastrophic bradycardia.

### Mobitz Type II Second-Degree Atrioventricular Block

*Mobitz type II second-degree AV block* is intermittent failure of AV conduction during stable atrial rates without antecedent PR prolongation and followed by recovery of AV conduction (see Fig. 9-4C). Mobitz II AV block is believed to always be a sign of block in the infranodal tissues, including the His bundle and bundle branches. Whereas infranodal block may rarely display Mobitz I (Wenckebach) periodicity, AV block at the level of the AV node does not result in true Mobitz II AV block periodicity.

The finding of Mobitz II AV block is always reason for concern. Although it may result from block in the His bundle or subsidiary bundle branches. Block within the His bundle accompanied by a narrow QRS complex is uncommon. In practice, Mobitz II AV block is usually preceded by the development of fixed bundle branch block. It has been believed that such bundle branch block patterns implied disease of the bundle branches themselves as they ramify within the ventricles. However in many cases of left bundle branch block, the disease process may actually be within