The Association of Complete Heart Block and Adams-Stokes Syndrome in Two Cases of Mobitz Type of Block

Case Reports

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IN second-degree atrioventricular (A-V) heart block atrial impulses fail to reach the ventricles. The best-known examples are 2:1 A-V block and A-V block with Wenckebach periods. Another more uncommon type of second degree A-V heart block is that of Mobitz. In this situation the P-R interval is fixed, although it may be less than, equal to, or greater than 0.20 second. At intervals a single ventricular beat is dropped, however, resulting in a 3:2, 6:5, 9:8, etc. response.

Examples of this variety of heart block are found mainly in atlases or textbooks dealing exclusively with the arrhythmias. Since the emphasis in these publications is on the electrocardiographic mechanism, only short accounts of the associated clinical picture are available. Our interest in reviewing this subject resulted from the observation of two patients with this type of electrocardiogram in whom Adams-Stokes seizures occurred.

Case Reports

Case 1

J. C. R., a 41-year-old white male carpenter was seen by one of us in consultation on January 6, 1959. He had been in good health until August 6, 1958, when on lifting a heavy object he became weak, diaphoretic, and clammy, and was driven home from work. The next morning he developed an episode of syncope, was hospitalized, and suffered about 50 episodes of syncope during the next few days. Electrocardiograms were reported to show complete heart block. Shortly thereafter he became asymptomatic and after a suitable interval was discharged from the hospital.

Physical examination at the time of consultation was entirely within normal limits, except for an irregular pulse. The electrocardiogram showed regular sinus rhythm with a P-R interval of 0.16 second. The P-R interval was constant, but there was no ventricular response to every third P wave. This cycle was constantly repetitive throughout the entire record. The QRS complex was widened to 0.13 second and the configuration was compatible with diaphragmatic infarction and right bundle-branch block (fig. 1A and 1B).

Three months later the physical and electrocardiographic findings were identical with those observed previously (fig. 1C). The patient is reported to be in good health at the time of this report.

Case 2

D. C., a 67-year-old white man, was admitted to the Newark Beth Israel Hospital because of progressive dyspnea and disorientation. He had been treated by one of us for severe pulmonary emphysema and fibrosis and cor pulmonale for many years. He was disoriented, markedly cyanotic, and dyspneic. The blood pressure was 130/60; ventricular rate, 84 and regular; respirations, 44. The lungs were filled with wheezes and rhonchi. An electrocardiogram taken at that time showed regular sinus rhythm with a P-R interval of 0.20 second. The QRS was 0.16 second with marked left axis deviation in the standard leads, a tall R in V₁, equiesiphic Rs waves in V₃, V₅, and V₆, and Rs in V₅ and V₆ (fig. 2A). This record was interpreted as showing evidence of an intraventricular conduction disturbance and myocardial damage.

After several hours the ventricular rate became irregular and another electrocardiogram revealed regular sinus rhythm with an atrial rate of 94. The P-R interval was again 0.20 second. At irregular intervals the ventricles failed to respond to the atrial pacemaker, resulting in periods of 5:4, 5:3, and 3:2 A-V block (fig. 2B). There were no changes in the QRS configuration.

In the subsequent 12 hours several Adams-Stokes seizures were observed. During these periods the electrocardiogram revealed complete heart block (fig. 2C). Somewhat later the patient died during one such seizure.
Figure 1A
Electrocardiogram showing a P-R interval of 0.16 second and a QRS duration of 0.13 second. The configuration is that of right bundle-branch block. The Q2, Q3, and QaVr suggest diaphragmatic infarction.

Figure 1B
Continuous tracing of lead II, showing a constant P-R interval of 0.16 second and P-P interval of 0.63 second. There is no ventricular response to every third P wave, resulting in alternating R-R intervals of 0.63 and 1.26 second (3:2 second-degree A-V heart block).

Figure 1C
Continuous tracing of lead II, taken 3 months after figure 1B. There is no essential difference in the arrhythmia or QRS configuration from the original electrocardiogram.
Electrocardiogram taken soon after admission. The rhythm is regular (not shown). The P-R interval is 0.20 and the QRS duration is 0.16 second. There is marked left axis deviation in the standard leads and a tall R wave in V1. These findings are interpreted as showing evidence of interventricular conduction disturbance and myocardial damage.

Continuous tracing of lead II taken 8 hours later, showing a constant P-R interval of 0.20 second and a constant P-P interval of 0.64 second. There is no ventricular response following the fifth, ninth, twelfth, and sixteenth P wave. The sequence is 5:4, 4:3, 3:2 and 4:3 second-degree A-V heart block. The QRS configuration is the same as that in figure 2A.

Continuous tracing of lead II, taken 10 hours after figure 2B. There is complete heart block. The P-P interval varies from 0.68 to 0.74 second, demonstrating sinus arrhythmia. The R-R interval is 1.32 seconds.
Discussion

Patients demonstrating the Mobitz-type block probably have serious organic heart disease. This arrhythmia has not been reported as an example of digitalis toxicity, or other drug toxicity, nor is it seen as a functional disturbance of rhythm in an otherwise normal heart.5-7

The arrhythmia in and of itself is one that evidently does not embarrass the cardiac output to a significant extent and is therefore compatible with good cardiac function, as exemplified by case 1. As with other forms of heart block, this arrhythmia may be unstable and may proceed to a more advanced degree of heart block, with the appearance of Adams-Stokes seizures. The latter were present at one time or another in both of our patients, and were also present in the original patient of Mobitz and in Spang's patient.1,4 The latter two cases are the only ones available in the literature with clinical histories. The presence of a constantly recurring 3:2 block of this variety, which maintains itself as demonstrated in case 1 is exceptional; we have not been able to discover a similar case.

The Mobitz block has been thought to result from a prolongation of the absolute refractory period of the atrioventricular node; the relative refractory period remains unchanged.3 This is in contradistinction to the mechanism underlying the Wenkebach phenomenon.

Frequently associated with the Mobitz-type A-V block is a change in the QRS complex. This alteration consists in a widening of the QRS complex to at least 0.12 second or greater, indicative of some type of intraventricular conduction disturbance. Occasionally these look like right bundle-branch block, while at other times the block is of the indeterminate variety. It is conceivable, therefore, that a dropped ventricular beat could result from intermittent depression of conduction in the functioning bundle branch. In essence, this type of A-V association may at times result from the development of a bilateral bundle-branch block, rather than a block at the level of the A-V node. Both mechanisms could conceivably be operative at various times in the same patient.

Summary

Two cases exhibiting the Mobitz-type of second-degree atrioventricular heart block are reported.

This rhythm may be unstable, and progression to complete heart block and Adams-Stokes seizures has been observed.

References

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