Paroxysmal Atrial Tachycardia with Exit Block

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The concept of exit block was introduced by Kaufmann and Rothberger in support of their theory of parasystolic origin of extrasystoles. The validity of this concept has been generally acknowledged. In clinical instances of paroxysmal tachycardia, however, evidence of exit block was only exceptionally observed. Phibbs reported on a case of atrial tachycardia in which pauses of the atrial rhythm occurred which measured double the basic cycle length.

The case of paroxysmal tachycardia with atrioventricular (A-V) block to be reported herein is remarkable in various respects: (1) It shows atrial pauses of various length which have a common denominator. (2) The manifest basic rate is only half of the actual rate of atrial impulse formation. (3) Observations made in this case support the view that it is hard to maintain a strict separation of atrial tachycardia and flutter.

Report of Case

A 65-year-old woman, who suffered from rheumatic heart disease with mitral regurgitation and stenosis, was admitted to the hospital on December 26, 1965, because of severe congestive heart failure. During 6 weeks of hospitalization, sinus rhythm alternated with atrial tachycardia associated with A-V block. When paroxysmal atrial tachycardia was present, the length of the basic atrial cycle was quite constant. It measured on the average 0.40 sec, corresponding to an atrial rate of 150/min (fig. 1). The rhythmic atrial activity was often interrupted by pauses which mostly measured 0.80 sec. It was thought that occasionally an atrial stimulus was prevented by an exit block from reaching the atrial myocardium. There were other pauses, however, which were not a multiple of 0.40, but measured 0.60 and 1.0 sec, respectively (figs. 1 and 2). It can be readily seen that the intervals of 0.40, 0.60, 0.80, and 1.0 sec, observed in this case, have a common denominator, namely, 0.20 sec. It was therefore postulated that the actual basic cycle length was 0.20 sec, which corresponded to an atrial rate of 300/min. This rate was masked by a constant 2:1 exit block, so that the manifest atrial rate was 150/min. When, on occasions, two, three, or four successive atrial stimuli were prevented by exit block from reaching the atrial myocardium, pauses resulted which measured 0.60, 0.80, or 1.0 sec, respectively.

The view that the actual basic atrial rate was 300/min was supported by further observations. Carotid sinus pressure was repeatedly tried. It either had no effect on the cardiac rhythm or merely increased the degree of A-V block. In one instance (fig. 3) during carotid sinus pressure, however, the atrial cycle length was abruptly halved for the duration of 1.0 sec. This was attributed to abolition of exit block by vagus effect. Vagus action is known to shorten the refractory period of the atrial muscle, thus permitting transmission of a rapid sequence of stimuli to the atrial myocardium. Later in the course of the patient’s hospital stay, attacks of atrial tachycardia developed spontaneously with an atrial rate of 300/min, as had been postulated on the basis of previous observations. Figure 4A shows an atrial tachycardia of 300/min. The base line between atrial deflections is iso-electric. This has usually been thought to be characteristic of paroxysmal atrial tachycardia. Figure 4B was obtained several days after figure 4A. It shows again an atrial rate of 300/min, but the atrial waves now form a continuous line of sawtooth appearance. This, for all purposes, is the picture of atrial flutter. Figure 4C was obtained 8 days after figure 4B. The atrial rate is again 300/min. The iso-electric base line can be seen between the atrial waves.

Comment

According to Lewis, the rate of atrial flutter is, on the average, 300, ranging from 220 to 370/min. On the other hand, in paroxysmal tachycardia with A-V block, the atrial rate ranges from 120 to 250/min. Thus, one might feel inclined to say that the case reported is a case of atrial flutter which, because of a 2:1 exit block, appears in the disguise of paroxysmal atrial tachycardia. It should be remembered that atrial flutter, when it is slowed down by treatment with quinidine, presents the electrocardiographic features of

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Figure 1

Paroxysmal atrial tachycardia with A-V block. The average atrial cycle measures 0.40 sec, corresponding to a rate of 150/min. There are pauses in the atrial activity which measure 0.60 and 0.80 sec, respectively. Their common denominator is 0.20 sec. (Cycle lengths in hundredths of a second.)

Figure 2

Same rhythm as in figure 1. Atrial pauses measure 0.60 and 1.0 sec, respectively. The common denominator of all atrial intervals is 0.20 sec. (Cycle lengths in hundredths of a second.)

Paroxysmal atrial tachycardia. Scherf and Schott\(^5\) expressed the opinion that none of the electrocardiographic parameters represented reliable criteria for the differentiation of atrial flutter and paroxysmal tachycardia. In experimental atrial flutter, however, vagus stimulation characteristically increases the rate of impulse formation.\(^6\)

Spontaneous transition from paroxysmal atrial tachycardia to flutter and fibrillation, and vice versa, has been repeatedly observed in clinical cases by these writers and has been reported by others.\(^7\)\(^,\)\(^8\) Indeed, some authors\(^9\)\(^-\)\(^11\) have maintained that there is no fundamental difference between paroxysmal atrial tachycardia and flutter. The case reported herein appears to support this contention.

Summary

A case of atrial tachycardia with A-V block is reported with a basic cycle length of 0.40 sec corresponding to an atrial rate of 150/min. Pauses of various length in atrial activity...
Paroxysmal atrial tachycardia with a cycle length ranging from 0.38 sec to 0.42 sec. During carotid sinus pressure, for a period of 1.0 sec, the length of the atrial cycle is halved. (Cycle lengths in hundredths of a second.)

The three tracings represent three attacks of atrial tachycardia, which occurred within 19 days. In A and C, an isoelectric baseline is seen between the atrial waves fitting the description of paroxysmal atrial tachycardia. In B, the atrial waves form a continuous curve of sawtooth appearance, fitting the description of atrial flutter. The atrial rate was exactly 300/min in all attacks.

were observed, and each was a multiple of 0.20 sec. These were attributed to the effect of an exit block. It was postulated that the actual atrial rate was 300/min, that is, double the manifest rate. In fact, doubling of the manifest atrial rate was temporarily produced by vagus stimulation and was observed also in spontaneous attacks which mimicked closely atrial flutter. These observations underline the difficulty of separating paroxysmal atrial tachycardia and flutter.

References
PAROXYSMAL ATRIAL TACHYCARDIA


Ancient Comments on Aging

The old retain their wits, provided their earnestness and energy lasts; and this happens not only with men who are illustrious, and who have held high office, but also in a life of privacy and repose. Sophocles wrote tragedies up to the period of extreme old age; and when, owing to this pursuit, he seemed to be neglecting his property, he was summoned by his sons into court, in order that, just as according to our custom fathers who are ruining their property are wont to be removed from the management of their possessions, so in his case the judges might remove him from the control of his estate as though in his dotage. Then the old man is said to have read out to the judges the play on which he was engaged and which he had last written, the Oedipus Colonus, and to have asked whether that seemed a poem by a man in his dotage; and when it had been read, he was acquitted by the votes of the judges.—W. F. MASOM and J. F. STOUT: CICERO, DE SENECTUTE: A TRANSLATION. London, University Tutorial Press Ltd., p. 9.
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