Paroxysmal Auricular Tachycardia With Block

Ralph M. Denham
Paroxysmal auricular tachycardia is a relatively common arrhythmia. The rate is usually between 150 and 220 per minute and the ventricles usually respond to each auricular beat. The attacks are usually of abrupt onset and last a few minutes or a few hours. Rarely they may last several days. Vagal stimulation, digitalis and quinidine usually will stop the attack. Barker and co-workers\(^1\) point out that auricular tachycardia seldom occurs in patients who have had previous attacks of auricular flutter or fibrillation, and that these disturbances, which are caused by circus rhythm are uncommon in patients who have had auricular paroxysmal tachycardia.

In 1943 Barker and co-workers\(^1\) stated that, "In rare instances of auricular paroxysmal tachycardia, the ventricles do not respond to each auricular beat in the usual manner." In their paper they reviewed seventeen previously reported cases and added eighteen additional cases of auricular tachycardia with block. In that same year Decherd, Herrmann and Schwab\(^2\) reported forty cases of paroxysmal supraventricular tachycardia with A-V block. They emphasized that these patients showing block usually had serious organic heart disease whereas those with paroxysmal supraventricular tachycardia without block commonly had no evidence of organic heart disease. Every patient included in their study had either myocardial disease, coronary or aortic disease conducive to myocardial anoxemia or had received digitalis. Twenty-three of these cases had received an obvious overdosage of digitalis. Six of their cases had exhibited atrial fibrillation before the occurrence of a A-V block and one case had exhibited atrial flutter. After termination of the block, four cases showed fibrillation and three flutter. Barker and co-workers\(^1\) found no evidence of heart disease in four of their eighteen reported cases. Rather serious organic heart disease was found in the other patients. They did not find that digitalis was a very great factor in the production of the arrhythmia and, in fact, thought digitalis of benefit in the treatment of many of these patients. Evans\(^3\) in 1944 presented twenty-seven instances of paroxysmal auricular tachycardia with block. Many of his cases would be classified as flutter by current criteria. More recently Lown and co-workers\(^4\) and later Lown and Levine\(^5\) have emphasized the importance of auricular tachycardia with block as it relates to digitalis and potassium. It has long been recognized that over-doses of digitalis can cause practically any form of arrhythmia but most of these arrhythmias have been attributed to the effects of digitalis on the ventricle. These recent reports emphasize that paroxysmal auricular tachycardia with block is a relatively common manifestation of serious digitalis intoxication.

The following features have been used to distinguish it from other types of rapid heart action.

1. An electrocardiogram is necessary to identify it.
2. The atrial rate varies from 120 to 250, the usual rate range being between 150 and 190.
3. The onset and offset are gradual and sequential. Varying degrees of block are present. Unlike untreated flutter, in which 2:1 block is the rule, only 30

\(^*\)Cardiologist, Practicing in Louisville, Kentucky.

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percent of the cases of paroxysmal atrial tachycardia with block shows such a response.

4. There is an isoelectric baseline between the P waves. This differs from flutter in that the baseline is constantly changing due to the undulation of the flutter waves.

5. The P waves, when discernible, are upright in leads 1, 2 and 3. Many times these are diminutive but in some cases the P wave is notched or peaked and of great size.

6. There is a tendency for the tachycardia to persist for several days or even months.

7. Thus, the arrhythmia shows some of the features ascribed to both auricular tachycardia and flutter.

In their report Lown and Levine\(^4\) cited sixty-six instances of this arrhythmia. They were from the records of the Peter Bent Brigham Hospital occurring over an eleven year period. Half of the episodes occurred during the preceding three years. In all except twelve of these instances digitalis was associated with the evidence suggesting either absolute or relative overdosage.

Prinzmetal and co-authors\(^6\) emphasize that A-V block does not exist in tachycardia when the conduction system is normal. Current textbooks of electrocardiography devote little attention to this arrhythmia.

We wish to report three additional cases of this arrhythmia recognized during the past sixteen months. Approximately 4,800 electrocardiograms were reviewed during this period.

**CASE REPORTS**

Case 1. R.N., a 74 year old woman with hypertensive heart disease had insidiously developed congestive heart failure over a period of several months. Four weeks before being seen for office consultation she was digitalized with digitoxin and then received 0.15

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**Figure 1. Case 1**

Paroxysmal tachycardia with block
mgm daily with extra supplements during the week before. Anorexia was the only subjective symptom. Examination revealed moist rales, gallop rhythm, rate 100, and pitting edema. casual examination of the electrocardiogram suggested sinus tachycardia but inspection of V₁ revealed auricular tachycardia with a 2:1 A-V block (auricular rate 200, ventricular rate 100). (Figure 1). Digitalis effect and left ventricular hypertrophy were evident. Digitalis therapy was discontinued. The patient was hospitalized twelve days later and expired seven days after admission. The electrocardiogram on the day of admission revealed nodal tachycardia with rate of 148.

The presence of persistent tachycardia led this patient to be overdigitalized in an effort to slow the rate. Without the help of the electrocardiogram which revealed the arrhythmia which is common with digitalis intoxication, we might have prescribed more digitalis.

Case 2. B.S., a 61 year old woman with rheumatic heart disease with both mitral and aortic valve lesions. For two years bouts of paroxysmal tachycardia had occurred frequently. Auricular flutter was suggested by the response to carotid sinus pressure during one attack. Quinidine did not control the paroxysms. Digitalization controlled the bouts and the maintenance dose was 0.85 grains of digitalis leaf taken only five times weekly. Eighteen months later she was hospitalized because of complaints of nausea, vomiting, anorexia, and palpitation following a severe diuresis provoked by Neohydrin given twenty-four hours previously. There was no objective evidence of congestive heart failure but the apical rhythm was grossly irregular with a rate of 65 per minute. Two weeks before at an office visit the rhythm was regular. The electrocardiogram recorded 12-28-53 revealed paroxysmal auricular tachycardia with block; the auricular rate 230 and ventricular rate 68 (Figure 2). The ventricular rhythm was irregular. Subsequent electrocardiograms at short intervals revealed auricular fibrillation and less digitalis effect. This patient was managed by withdrawal of digitalis and administration of quinidine orally. To date the auricular fibrillation has persisted and the ventricular rate has been well controlled with gitalin.

Apparently the arrhythmia in this instance was due to digitalis intoxication following diuresis. It is possible that the arrhythmia was a transition phase in the develop-
ment of auricular fibrillation due to long-standing rheumatic heart disease. The persistence of auricular fibrillation is suggestive of this but there has been no further deterioration of the patient as far as cardiac compensation is concerned.

Case 3. This patient was a 72 year old man admitted to the hospital 9/25/54 with a four year history of angina of effort and a two year history of dyspnea and edema. He had been on some diuretic therapy and an unknown amount of digitalis for several weeks prior to hospitalization. Objective physical findings at the time of admission revealed slight edema. The lung fields revealed no moisture. The cardiac rhythm was regular with a very slow rate. The blood pressure was normal and there was no history of hypertension. The electrocardiogram on September 25th showed sinus bradycardia with a prolonged PR interval (Figure 3). On that date, the patient received 2cc of mercuhydrin. The following day he was given 500cc of blood transfusion for a mild anemia. On September 26th there was sudden onset of tachycardia. He was given quinidine hydrochloride 0.3 Gm. intramuscularly every eight hours for three doses only. The electrocardiogram revealed a paroxysmal auricular tachycardia with a 2:1 heart block. The patient was given a total dose of 1.2 mgms. of cedilanid intramuscularly on September 27th. He was nauseated and vomiting and placed on 0.1 mgm. cedilanid intramuscularly daily and this was discontinued on October 6th. On September 28th, potassium chloride 10 grs. three times daily for 24 hours and then twice daily was started and continued until October 26th. The auricular rate increased to 270 on October 4th and the ventricular rate was 90. Auricular tachycardia was still present and there was a 3:1 heart block. On October 11th the auricular rate was 283 and the ventricular rate 120 and there was no longer a regular ventricular response to any auricular impulses. On October 15th the patient was again placed on quinidine, 0.2 grams twice.
daily by mouth and this was continued for six days. On October 28th the patient was
given 1.2 mgms of cedilanid intramuscularly and then 0.2 mgms. intramuscularly daily
as maintenance. We did not see this patient at any time, but observed his electro-
cardiograms and offered no advice as to therapy. The last note on the progress of
the patient mentioned that he was improving, although it gave no specific details
of physical findings. He was discharged from the hospital on November 4, 1954.

COMMENT AND DISCUSSION

The chief importance of paroxysmal auricular tachycardia with block is its occur-
rence as a result of digitalis intoxication. In all three of these cases digitalis has been
a factor. If the ventricular response to the auricular tachycardia is irregular, it may
be mistaken for auricular fibrillation; if a 2:1 block is present, it may mimic auricular
flutter. The A-V block may be variable and the rate of the auricular tachycardia may
change from time to time (Case 3). The ventricular rhythm may be regular for certain
periods interrupted by irregularity and the ventricular rate may vary although the
auricular tachycardia persists at a regular rhythm. Should the clinician find the ventri-
cular rate rapid by auscultation and interpret his findings as due to auricular fibrillation
or flutter, he is likely to increase the dose of digitalis (Case 1). In the event that
paroxysmal auricular tachycardia with block is present due to digitalis intoxication,
this may be disastrous, leading to more serious arrhythmia or even death.

According to Lown and Levine,5 "When the ventricular rate of a patient with long-
standing fibrillation accelerates or regularizes after a diuresis or an increased dose of
digitalis, tachycardia with block should be suspected." These authors have given a
thorough description of paroxysmal auricular tachycardia with block including the
experimental production by digitalis toxicity and potassium removal, as well as clinical
observations.

This arrhythmia may be increasing in frequency and parallels to some extent
the increasing incidence of digitalis intoxication. This may be related to the increasing
use of cardiac glycosides, but the changing methods in the management of patients
with congestive heart failure also is a factor.5 Use of mercurial diuretics in over-
digitalized patients promotes potassium diureses which in turn enhances digitalis effect
on the myocardium. Such a diuresis may have been responsible for the arrhythmia in
Case 2 and Case 3. The arrhythmia is most frequently seen in patients with advanced
congestive heart failure.

Careful study of the electrocardiogram will identify this arrhythmia. Lown et al4
remarked that electrocardiographic identification may be difficult because of the
presence of one or all of the following features: (1) changing degrees of A-V block
in consecutive complexes, (2) absence of arithmetic ratio between auricular and
ventricular response as is true in most cases of flutter,(3) diminutive P waves, and
(4) a rapid ventricular rate. We might add that when the ventricular complex and ST
segment are abnormal the P wave may be obscured (Case 1) and the electrocardiogram
may be interpreted as sinus tachycardia.

Evans3 emphasized that the delineation between auricular tachycardia and auricu-
lar flutter is a narrow one. He suggests that the terms are interchangeable.
Prinzmetal and co-authors have critically reviewed the criteria for diagnosing tachycardia and flutter and have presented many examples of electrocardiograms showing that there is no sharp line of demarcation between “tachycardia” and “flutter.” They suggest that the term of auricular flutter be abolished. Their idea is that “auricular flutter is a tachycardia at an auricular rate rapid enough to cause physiologic auriculoventricular block.” They further recommended that the term auricular tachycardia be retained and that it should be redefined to include all arrhythmias now diagnosed as auricular tachycardia, auricular flutter or borderline cases. An example of one of these borderline cases would seem to be Case 3 which we have presented. No typical “flutter” waves were identified in any of the leads of the electrocardiogram but the rate is certainly above the commonly accepted upper limit for auricular tachycardia. (Figure 3, 10/4/54 and 10/11/54). In cases 1 and 2 we see that auricular tachycardia with block may be transient and followed by other arrhythmias.

Paroxysmal auricular tachycardia with block usually occurs in patients with advanced heart disease and the appearance of this arrhythmia is an ominous sign. If it is due to digitalis, it may be corrected. However, Decherd et al reported a mortality rate of 55 percent in hospitalized patients, these deaths occurring before the patients left the hospital. Lown and Levine had a mortality of 60 percent. One of our patients died twelve days after the arrhythmia was recognized and one is still alive ten months after cessation of the arrhythmia. The third patient has only been under observation in recent weeks and still has the arrhythmia but clinically remains seriously ill. Lown and Levine believed the high mortality was due to the continued administration of digitalis because of the finding of tachycardia.

By the administration of potassium salts the arrhythmia may be restored to a normal mechanism if the paroxysmal auricular tachycardia with block is due to digitalis. Cases of idiopathic origin do not respond to this therapy. Lown and Levine have emphasized this point and were successful in the abolition of the arrhythmia in ten instances which were induced by digitalis. In two of our cases, potassium chloride was given orally but was not given in therapeutic doses. Procaine amide may be successfully employed in this arrhythmia.

**SUMMARY**

1. Three cases of paroxysmal auricular tachycardia with block are presented.
2. Until recently paroxysmal auricular tachycardia with block has been regarded as an uncommon arrhythmia. It quite likely is more common than is recognized generally.
3. Paroxysmal auricular tachycardia with block is produced by digitalis overdosage especially in the presence of loss of body potassium. When induced by digitalis it may be abolished by potassium therapy.
4. Current ideas regarding the relation of this arrhythmia to the other auricular arrhythmias are reviewed.
5. This arrhythmia is usually of serious prognostic significance.

**BIBLIOGRAPHY**


16161 Hayburn Blvd.
Louisville, Kentucky