Electrical Conversion of Paroxysmal Atrial Fibrillation in the Wolff-Parkinson-White (Pre-excitation) Syndrome*

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RAPID heart action occurs frequently in patients with Wolff-Parkinson-White syndrome.[1] Supraventricular tachycardias are most common, whereas ventricular tachycardias are considered rare in this entity.[2] The majority of authors believe that tracings showing irregularly spaced, widened QRS complexes are most probably instances of atrial fibrillation (rarely of atrial flutter) with a rapid and irregular conduction through the accessory bundle.[1-4] Although this arrhythmia associated with pre-excitation is usually benign,[5] prolonged attacks in the otherwise normal heart and especially in those patients with complicating organic cardiac disease may produce irreversible damage.[6] Occasional instances of death secondary to Wolff-Parkinson-White arrhythmias have been reported.[7]

There is still disagreement on which drug is most effective in these cases of pseudoventricular tachycardia.[8] While some prefer digitalis alone,[1,6] others favor procainamide or quinidine.[9] On the other hand, Katz and Pick advise using a combination of digitalis and quinidine.[3]

There are few reports of electroconversion[10-13] being used to abolish arrhythmias associated with the Wolff-Parkinson-White syndrome.[14] The experience gained with the use of cardioversion in the treatment of three cases of atrial fibrillation occurring with ventricular pre-excitation is presented in order to add to the indications for such therapy in cardiac arrhythmias.

MATERIAL AND METHODS

Six patients with the pre-excitation syndrome and supraventricular tachycardias were studied. Three had regular rates and will be discussed only in part. The other 3 presented with atrial fibrillation. The diagnosis was based on the following: (1) a previous electrocardiogram showing the classical pattern of Wolff-Parkinson-White syndrome; (2) a history of attacks of palpitations in an otherwise normal individual; (3) tracings which show variable QRS intervals and an irregular and rapid rate, and occasional normal ventricular complexes.[2]

All patients were anesthetized with intravenous sodium methohexital (Brevital®) with doses ranging from 30 to 50 mg., given at a rate of 10 mg./sec. D.C. electric shock was applied by using a Cardioverter (American Optical Co.) according to the methods outlined in previous communications.[15,16] The initial energy setting was 100 watt-sec. This was increased progressively to 200, 300, and 400 watt-sec. if needed. The procedure was terminated if conversion did not occur after use of 400 watt-sec.

CASE REPORTS

CASE 1. A 21 year old man was admitted because of syncope. He had awakened that morning in good health but immediately after arising had a sudden dizzy spell and collapsed. On regaining consciousness he noted severe palpitations and slight dyspnea. He had a similar transient episode four years previously but was not hospitalized.

Physical examination revealed an anxious, dyspneic young man complaining of palpitations and substernal discomfort. No murmurs were heard. The apical rate was irregular with an average of 275 beats/min. The blood pressure was 90/75 mm. Hg. There were no signs of heart failure.

The electrocardiograms (Fig. 1) showed widened and irregular QRS complexes; occasionally normal ventricular deflections were seen. P waves could not be identified. The rate ranged between 235 and 315/min. (top strip). Carotid sinus massage and ocular pressure failed to alter the rhythm. The diagnosis of

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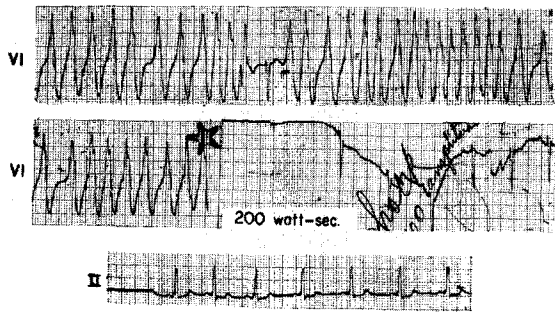

FIG. 1. *Case 1.* Electrical conversion (DC shock) of paroxysmal atrial fibrillation (middle strip) in a patient with WPW syndrome (lower strip).

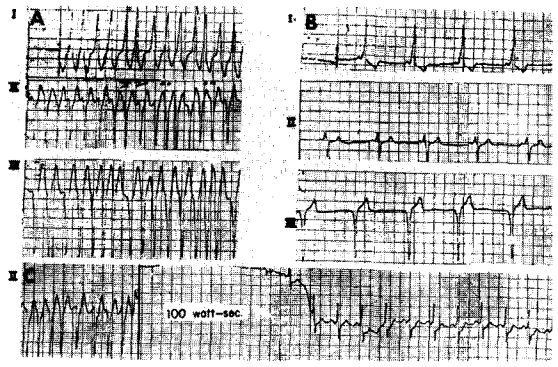

FIG. 2. *Case 2.* Electrocardiograms before (A) and after (B) electrical conversion (D.C. shock) of atrial fibrillation (C) in a patient with WPW syndrome.

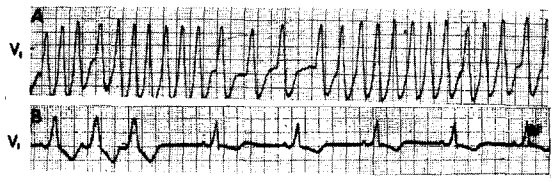

FIG. 3. *Case 3.* Electrical conversion (D.C. shock) of atrial fibrillation (A) in a patient with WPW syndrome (B).

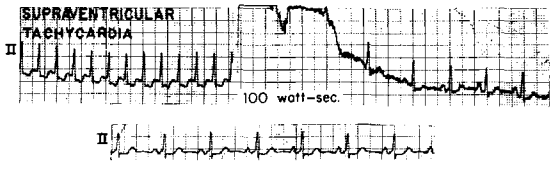

FIG. 4. Electrical conversion (D.C. shock) of a regular supraventricular tachycardia occurring in a patient with WPW syndrome.

atrial fibrillation with the pre-excitation syndrome was made, and the patient was considered a candidate for cardioversion. A shock of 100 watt-sec. was ineffective, but one of 200 watt-sec. converted the arrhythmia to sinus rhythm (middle strip). Somatic tremor prevented the study of the delta wave in lead V_1; however, the QRS complexes showed a morphology different from that seen during atrial fibrillation.

CASE 2. A 22 year old medical student was admitted because of rapid heart action. He had been known to have Wolff-Parkinson-White syndrome since early childhood with episodes of paroxysmal tachycardia which were more frequent early in life and lessened in frequency in his late teens. He attributed these attacks to emotional stress during school examinations. All but one of the attacks terminated spontaneously, and that one required intravenous digitalization. The tracings during the paroxysm revealed regular supraventricular tachycardia with widened QRS complexes. They had been interpreted as paroxysmal atrial tachycardia, but flutter with 2:1 A-V conduction could not be excluded.

On this admission he complained of paroxysmal and irregular palpitations but was in no distress. Murmurs were not heard. The apical rate ranged from 240 to 270 beats/min. The blood pressure was 100/70 mm. Hg. There was no evidence of heart failure.

The electrocardiogram (Fig. 2A) showed wide and irregular ventricular complexes at a rate of 180 to 280 beats/min. All QRS complexes were abnormal and varied in duration. No P waves were detected (Fig. 2A). The diagnosis of atrial fibrillation with the pre-excitation syndrome was made, and the patient was considered for cardioversion. A shock of 100 watt/sec. produced prompt conversion to sinus rhythm (Fig. 2C). The postconversion electrocardiogram revealed the pre-excitation syndrome (2B). The QRS complexes during and after the paroxysms were similar.

CASE 3. A 43 year old woman with rheumatic heart disease and mitral stenosis and insufficiency was admitted because of dyspnea and paroxysmal tachycardia. She had experienced a similar attack in the past year. At that time the electrocardiogram showed widened and irregular QRS complexes occurring at an average rate of 250/min. At first, 2 mg. of deslanatoside (Cedilanid) was given over a 20 hr. period, with little change in the ventricular rhythm; 24 hr. after admission she was given 1.5 gm. of procainamide in a 30 min. period, which resulted in a slower ventricular response and the appearance of an occasional narrow QRS complex. A diagnosis of atrial fibrillation and the pre-excitation syndrome was made and the patient was treated with quinidine gluconate (Quinaglute®), 0.33 gm. every six hours, and digoxin, 0.25 mg. every eight hours. Sinus rhythm recurred three days later.

Physical examination during the present admission revealed moderate dyspnea and an average apical rate of 275/min. The blood pressure was 80/65 mm. Hg. There was loud, harsh, systolic murmur transmitted to the axilla. Moist rales were heard at both

lung bases. During the examination frank pulmonary edema developed. She was treated with oxygen, meperidine and rotating tourniquets. The patient received 0.6 mg. of intravenous lanatoside initially, which was repeated 45 min. later. The apical rate remained unchanged. The electrocardiogram (Fig. 3A) showed widened and irregular QRS complexes occurring at a rate of 150 to 270/min. QRS complexes of normal contour were not observed.

The diagnosis of atrial fibrillation with Wolff-Parkinson-White syndrome was made. Because her condition continued to deteriorate, she was given D.C. shock of 100 watt-sec. This was ineffective, and a second electric shock with an energy of 200 watt-sec. resulted in sinus rhythm (Fig. 3B). The P-R interval was short, and a delta wave was present. The patient immediately began to improve and was placed on maintenance digoxin.

Discussion

There have been few published reports on the use of D.C. electric shock in the treatment of arrhythmias in the Wolff-Parkinson-White syndrome.[14] Three cases are presented in which electric conversion was used in the treatment of atrial fibrillation with the pre-excitation syndrome. Atrial fibrillation can be reverted in 91 to 92 per cent of the patients with various heart lesions.[13] The same degree of success could be expected when this arrhythmia occurs in the presence of the Wolff-Parkinson-White syndrome. Regular supraventricular tachycardias which occur in this syndrome will also respond to electric shock.[14] Nine episodes of this arrhythmia occurring in 3 patients have been treated in our department (1 is presented in Fig. 4). However, still more experience is needed to analyze properly the effects of D.C. electric shock in this and other types of atrial or A-V nodal tachycardias not induced by digitalis overdosage. The hazards of digitalis intoxication, hypokalemia and quinidine cardiosensitivity also need further evaluation.[12,13,15–18]

Summary

D.C. electric shock proved to be a safe, effective method for abolishing paroxysmal atrial fibrillation in 3 patients with Wolff-Parkinson-White syndrome. In 1 case, the speed of action of electrical conversion (sec.) contrasted with that of drugs (3 days). Other patients with regular supraventricular tachycardias and narrow QRS complexes were also successfully treated electrically.

Acknowledgment

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