Several articles have dealt with ectopic impulse formation in the accessory pathways of patients with Wolff-Parkinson-White syndrome. Yet, to the best of our knowledge, the occurrence of ectopic parasystolic beats arising in the accessory pathway itself has not been reported. The following is an example of this unusual arrhythmia.

CASE REPORT

A 31-year-old man had preexcitation syndrome (Wolff-Parkinson-White, type A) and recurrent supraventricular tachyarrhythmias. Figure 1A shows atrial fibrillation with rapid ventricular rates (240 to 260/min). The QRS complexes have the morphology characteristic of exclusive conduction through a left-sided accessory pathway.

Figure 1B, showing sinus rhythm, was obtained a day later. The 1st, 2nd, 4th, 5th, and 7th ventricular complexes (with a P-R interval of 0.12 sec and a delta wave) are the ordinary fusion beats that patients with preexcitation syndrome present. These fusion beats occur because ventricular depolarization is a function of two wavefronts (from one atrial impulse) that reach the ventricles through two

(A) ATRIAL FIBRILLATION

(B) SINUS RHYTHM

Figure 1 (A): Wolff-Parkinson-White syndrome, type A with rapid atrial fibrillation and exclusive conduction through left-sided accessory pathway. (B): Wolff-Parkinson-White syndrome, type A (during sinus rhythm) with parasystolic beats arising in accessory pathway.
(normal and accessory) pathways.

In addition, there are two ectopic beats not preceded by P waves (third and eighth QRS complexes), which show the morphology characteristic of exclusive accessory pathway conduction (Fig 1A). This finding is consistent with ectopic impulse formation within the accessory pathway itself. Furthermore, a parasystolic mechanism is suggested by the marked variations in the coupling intervals, the occurrence of unusual fusion beats, and the mathematical relationship of the interectopic intervals.

For example, whereas the coupling interval of the first ectopic beat is 0.96 sec, the coupling interval of the second ectopic beat is 0.56 sec. Also, the interectopic interval between these (two) ectopic beats (4.730 sec) is three times the assumed ectopic cycle length (1.560 sec). A careful analysis of the strip suggests that the ectopic cycle length is the interval between the last ectopic beat and the sixth ventricular complex. The latter is preceded by a P wave and ends at an R-R interval (0.97 sec) that is slightly shorter than the preceding R-R interval (1 sec).

In addition, it shows a greater degree of preexcitation than the 1st, 2nd, 4th, 5th and 7th ventricular complexes.

The sixth QRS complex occurs because the parasystolic impulse is initiated (within the accessory pathway itself) before the wavefront propagating through the atria has time to reach the site of ectopic impulse formation (in the accessory pathway). Consequently, the ventricles are depolarized by two wavefronts (from two impulses; one originating in the sinus node, and the other arising in the accessory pathway), which reach the ventricles through the two (normal and accessory) pathways.

In spite of the ECG resemblance with the 1st, 2nd, 4th, 5th, and 7th QRS complexes, the differences in the underlying electrogenetic mechanisms indicate that this is not an ordinary, but an unusual, type of fusion ventricular beat that can occur in some patients with preexcitation syndrome.

Finally, the diagram in the bottom part of Figure 1B shows that of the five parasystolic discharges, two, the second and fifth, are manifested (in the surface leads) as pure ectopic beats, and one, the fourth, as the unusual fusion beat previously described. In addition, two parasystolic discharges, the first and third, have no visible manifestation in the surface ECG because they occurred while the ventricles were effectively refractory.

**DISCUSSION**

The ectopic beats in this case meet the criteria for parasystole, and the total preexcitation is the result of impulse arising in the accessory pathway itself rather than other unusual mechanisms.

In previous reports a parasystolic mechanism was not implicated in the genesis of the premature or late (escape) beats that were observed to arise within the accessory pathway of patients with Wolff-Parkinson-White syndrome.

Although Dubb and Schamroth and Pick and Langendorf reported the occurrence of parasystole in patients with Wolff-Parkinson-White syndrome, in their cases the ectopic beats arose in the ventricles, not in the accessory pathway itself. Those authors also observed another (unique) type of fusion beat, different from the ordinary (and the unusual) fusion beats shown in Figures 1A and 1B. Pick and Langendorf used the term double fusion beat to imply that the ventricles were depolarized by three wavefronts (from two impulses, one atrial and one ventricular) that propagated from: (1) the ventricular end of the normal pathway; (2) the ventricular end of the accessory pathway; and (3) the ectopic ventricular site of impulse formation.

Although ectopic impulse formation in the accessory pathways has been previously described, the case in this report adds two new findings—ectopic impulse of a parasystolic nature and unusual fusion beats in such cases that have different mechanisms but morphologic characteristics somewhat resembling the ordinary fusion beats.

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