Alternating bizarrely-shaped broad QRS complex tachycardia. What is the mechanism?

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Answer to the rhythm puzzle

Figure 1 is an atrial flutter with 1:1 conduction and atypical left bundle branch block (LBBB) as a result of flecainide use. Figure 2 is still an atrial flutter but with 2:1 conduction and no functional aberration. A total atrioventricular block was achieved after the administration of intravenous adenosine, revealing the flutter waves as shown in Fig. 3.

Antiarrhythmic drugs, especially those that slow conduction such as class Ic drugs, may cause proarrhythmia represented by monomorphic ventricular tachycardia (VT). On the other hand, these drugs may cause bizarre aberrant conduction during supraventricular tachycardia which may mimics VT [1]. The QRS complex during aberration is characterised by a QRS duration between 180 and 240 ms and bizarre right bundle branch block (RBBB) with a right or northwest axis, or atypical LBBB with left axis, mimicking VT [2]. The explanation of the occurrence of this bizarrely shaped BBB during treatment with class Ic antiarrhythmic drugs, particularly flecainide, is as yet uncertain. A possible explanation is the occurrence of use-dependent conduction delay especially in the myocardium beyond the block [2]. In contrast, conduction is relatively unhampered in areas activated by way of the His-Purkinje system, preserving the initial part of the QRS complex. That

conduction delay due to flecainide is more pronounced in the ventricular myocardium than in the His-Purkinje system has been suggested by animal experiments [2]. In contrast to the situation during a straightforward BBB, this may result in an exaggerated asynchrony of activation of the various parts of the heart, giving rise to a bizarre type of BBB [2]. Electrical alternans is usually seen in (narrow complex) circus movement tachycardia. Beat-to-beat variations can occur during tachycardia whether ventricular or supraventricular because of an alternating discrete conduction disturbance with beat-to-beat variation in the width and shape of the QRS complexes, as in this case [3].

References

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Fig. 1 Broad QRS complex tachycardia with obvious QRS alternans

Fig. 2 ECG after spontaneous stabilisation of the tachycardia

Fig. 3 Rhythm strip showing flutter waves after achieving total atrioventricular block using intravenous adenosine