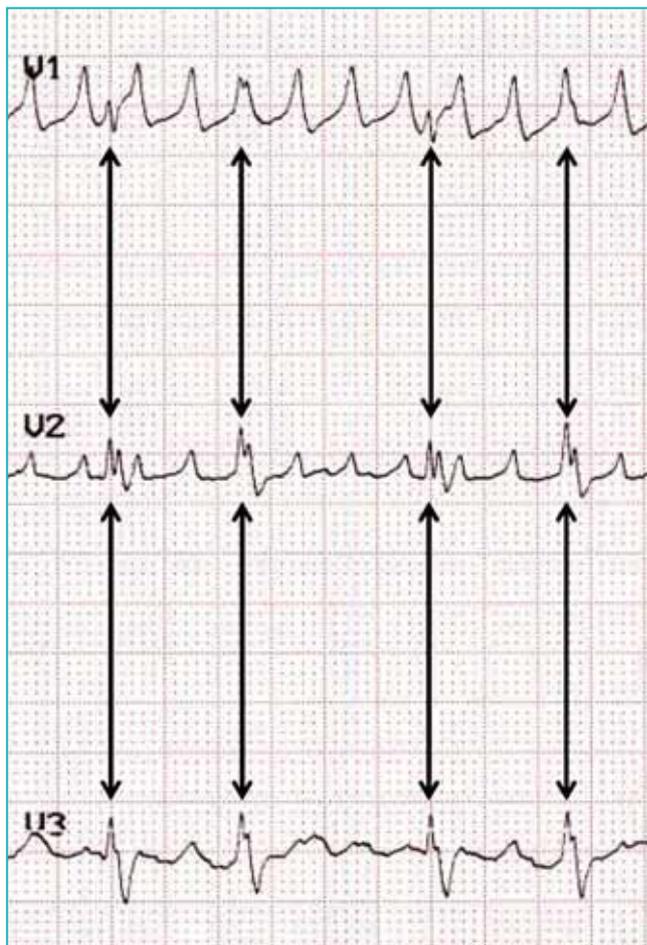


## OVERVIEW OF THE ECG

The immediate impression is of an extremely rapid, regular wide QRS tachycardia. Is it real or is it artefact?

## MORE DETAILED ANALYSIS OF THE ECG

The rapid deflections are regular at a rate of 288/minute (48 x 6). They are the largest deflections in the rhythm strip (V1), but are somewhat smaller in other leads, particularly Lead I and V6. Inspection of these leads reveals what appear to be irregular QRS complexes at a much lower rate. In V1, these complexes are small and partially hidden by the larger waves. They can, however, be identified by comparing V1 to the simultaneously recorded V2 and V3 (Figure 1).



**FIGURE 1:** The arrows indicate the QRS complexes, partly obscured in V1.

The QRS complexes are wide (120 - 130ms), without being typical of either right or left bundle branch block. They are irregular at a rate of 96/minute (16 x 6). The frontal plane QRS axis is about +80°. The QRS voltage is low, particularly in the limb leads (<0.5mV). There are no pathological Q-waves.

Once the QRS complexes are identified at a normal rate, and are separate from the large rapid deflections, it is clear that the rhythm is not ventricular flutter or fibrillation.

What, then, is the mechanism of the rapid deflections? Are they intrinsic cardiac depolarisations or extracardiac noise?

AC interference is at 50Hz (3 000/minute) and is easily excluded.

The tremor of Parkinson's disease is usually in the region of 5/second (300/minute). The rate of the rapid deflections is in the correct range (288/minute), but it is unlike Parkinson's (Figure 2) in a number of respects:

- Parkinson's tremor is often slightly irregular, whereas the deflections on this ECG are regular.
- Parkinson's tremor is most visible in the limb leads, as opposed to the most prominent deflections being in V1 on this ECG.
- The deflections of Parkinson's and other muscle noise are narrow and "spiky"; the deflections in question are at least 100ms in duration. The waves in the inferior leads show a continuous "saw tooth" pattern, consistent with typical atrial flutter.
- The irregular ventricular response is consistent with varying conduction from the atria.
- Despite the above comments, Parkinson's tremor sometimes closely mimics atrial flutter and, occasionally, ventricular tachycardia.

The correct answer is therefore (c): **atrial flutter with varying AV block**.

The very large amplitude flutter waves are unusual. This, together with the abnormal QRS complexes, suggests significant structural heart disease, with left ventricular dysfunction and large atria. The patient was a 43-year-old man with idiopathic dilated cardiomyopathy and a very large heart.



**FIGURE 2: ECG of a patient with Parkinson's tremor.**

Note the prominent rapid deflections, most obvious in Lead I and least visible in V4 to V6. The muscle noise is irregular, around 300/minute, with narrow deflections. Normal atrial activity can be seen clearly in V4 to V6.

## LESSONS AND CONCLUSIONS

- Rapid, bizarre complexes on ECG may be due to artefact.
- Occasionally, P-waves may be larger than QRS complexes, especially in very abnormal hearts.
- Muscle tremor from Parkinson's mimics atrial flutter, but normal P-waves are visible in less affected leads.

Thank you to Dr Ashley Chin for the use of the ECG.

**Conflict of interest: none declared.**

**ECG and QUESTION** on page 32