

EP CASE REPORT

A case of wide complex tachycardia with regular fusion beats

Debjit Chatterjee*

Cardiology Department, Medway Maritime Hospital, Windmill Road, Gillingham, ME7 5NY, UK

* Corresponding author. E-mail address: debjit.chatterjee@hotmail.com

A 90-year-old man was admitted with palpitation and chest tightness for 2 h. He was known to have persistent atrial fibrillation (AF) for many years and had a single chamber pacemaker (VVIR) implantation 9 years ago. His echocardiogram, about a year ago, showed moderate left ventricular dysfunction and moderate aortic stenosis. There was no past history of angina or myocardial infarction. He was haemodynamically stable.

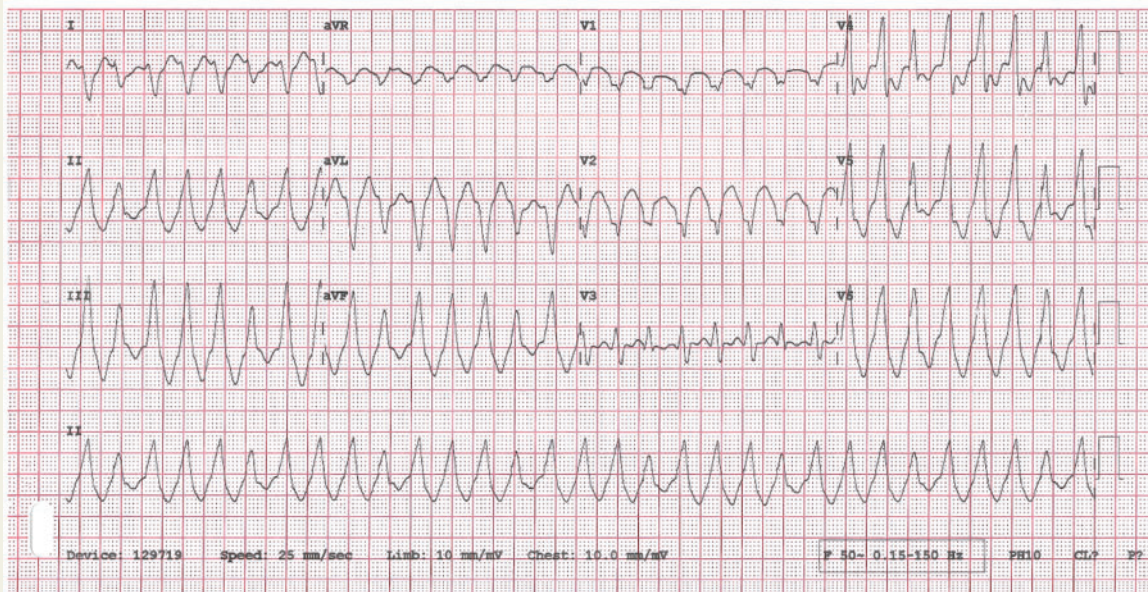
He was initially treated with intravenous amiodarone 300 mg over 30 min but continued to be in wide complex tachycardia and hence a direct current cardioversion was performed under sedation which reverted his rhythm to AF with ventricular pacing at 75 b.p.m.

What was the rhythm and why was every 4th beat morphology different from others?

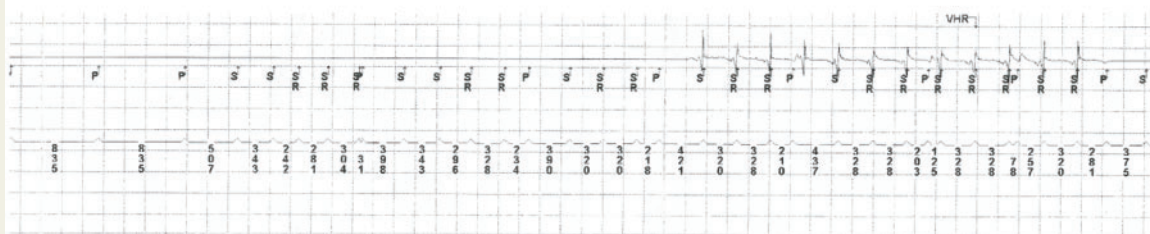
Answer: This was ventricular tachycardia (VT) at a rate of 187 b.p.m. Every 4th beat was a fusion of pacing beat and intrinsic ventricular rhythm.

Explanation: This was a regular wide complex tachycardia. There was substrate for VT. He had moderate left ventricular dysfunction. He was known to have persistent AF for few years and hence any regular supraventricular rhythm was very unlikely.

ECG on presentation at emergency department



Pacemaker interrogation



Every 4th beat was a fusion complex which normally indicated atrio-ventricular (AV) dissociation in case of VT. Presuming he was in persistent AF, fusion beat due to some regular supraventricular rhythm was not possible. Rarely in presence of AF, VT can show evidence of fusion but in that case fusion beats will be irregular.¹ But the different QRS morphology here was happening on a regular interval (every 4th beat) which was not possible with AF. Generally, a fusion beat is a manifestation of AV dissociation and hence by definition is irregular in timing.

Following cardioversion, pacemaker interrogation was done, and this helped us to understand the mechanism of regular fusion. Because the tachycardia cycle length was less than ventricular refractory period (which in this case was 330 ms), the pacemaker went into noise reversion mode and pacemaker was behaving as if it was sensing noise and not tachycardia. Hence sensing during refractory period was restarting another cycle of refractory period (and its blanking period). This is called continuous refractory sensing or noise reversion mode, and this will cause asynchronous pacing at the sensor indicated rate in a case of VVIR pacemaker. The pacemaker was delivering a pacing stimulus 857 ms from the last sensed event here (lower rate of 70 b.p.m.) and every 4th beat was a fusion of pacing beat and intrinsic VT beat.

Acknowledgements

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Reference

1. Nabar A, Rodriguez L-M, Timmermans C, Kattenbeck K, Wellens HJJ. Capture and fusion beats during atrial fibrillation and ventricular tachycardia. *Heart* 2000;**84**:E1.