CASE REPORT

A not so benign atrial flutter: spontaneous 1:1 conduction of atrial flutter

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SUMMARY

A 1:1 conduction of atrial tachyarrhythmias, although not uncommon, usually is associated with the use of antiarrhythmic drugs; hyperthyroidism etc. Spontaneous 1:1 conduction of atrial flutter is indeed rare. We present a case of a spontaneous 1:1 conduction of a cavotricuspid isthmus-dependent atrial flutter.

CASE PRESENTATION

A 50-year-old healthy man presented to an outside hospital with sudden onset of palpitations that lasted about 2 min before resolving on its own. It was associated with lightheadedness and dizziness. He denied any chest pain, shortness of breath and oedema. He reported two similar episodes in the past that resolved spontaneously, one of which occurred in the middle of the night lasting for 15 min and the other lasting for 2 min. A 12-lead ECG and telemetry were obtained. He was found to have atrial fibrillation with rapid ventricular rate around 150 bpm and atrial flutter (AFL) with 1:1 conduction at a rate approximately 280 bpm. He was diagnosed to have AFL with 1:1 conduction, he was treated with diltiazem infusion which cardioverted him to a normal sinus rhythm of around 70 bpm. He was transferred to our facility for further management.

His history was otherwise unremarkable; there were no recent illness or change in his health habits. Blood tests ruled out an acute coronary syndrome, his thyroid function tests were within normal limits. A two-dimensional echocardiogram showed a normal functioning of the left ventricle with a normal-sized left atrium. A bicuspid aortic valve with mild aortic insufficiency was also noted. He remained in normal sinus rhythm throughout his hospital stay. He was discharged on β -blockers and aspirin.

Subsequent electrophysiology testing was able to elicit only atrial fibrillation on atrial stimulation that was cardioverted. His HV interval was recorded at 44 ms, multiple attempts to induce AFL failed. Nonetheless, patient underwent cavotricuspid isthmus flutter ablation, as clinically his tachycardia matched AFL; moreover, it was felt that with a 1:1 conduction, it was better to ablate his tachycardia. He did well postprocedure, and has since remained symptom free.

DISCUSSION

After atrial fibrillation, AFL has been identified as the most important and most common atrial tachyarrhythmia. AFL is basically an ECG model of atrial tachycardia >240/min, which has a uniform

and regular continuous waveform. Its incidence has been reported to be 88/100 000 person-years in the general population, and is believed to be 2.5 times more common in men.¹ The incidence increases with age. The risk of developing AFL increases 3.5-fold in patients with heart failure and 1.9-fold in patients suffering from chronic obstructive pulmonary disease. Hyperthyroidism has been identified as a predisposing factor for AFL.

In patients having pulmonary embolism, septal defects, mitral or tricuspid valve disease, or chronic left ventricular failure, atrial dilation is a common phenomenon. AFL appears to occur secondary to this dilation. Sometimes it has also been reported in patients without any underlying heart disease, especially in patients with metabolic disturbances, like thyrotoxicosis, alcoholism, etc.² On few occasions, it has been seen that AFL can initiate fibrillation,³ ablation of flutter can decrease in incidence of fibrillation in such patients.

AFL with 1:1 atrioventricular (AV) conduction is a rare entity. Normally not all of the impulses can reach the His-Purkinje system based on the physiological properties of the AV node. In most of the cases, ventricular rate is lower than the atrial rate during AFL and fibrillation. In AFL, classically, a 2:1 conduction occurs across the AV node; as a result, the ventricular rate is about one-half the flutter rate provided there is no AV node dysfunction, which produces the typical ventricular rate of 150 bpm (figure 1). Class I antiarrhythmic drugs are known to slow down the atrial rate, increasing the probability of 1:1 AV conduction during their use, especially in patients with rapid AV nodal conduction.⁴ Accessory AV conduction pathways connecting the atria to the ventricles can cause fast conduction of impulses through AV node increasing the likelihood of 1:1 conduction in AFL.⁵ Conditions like hyperthyroidism that potentiates AV conduction may occasionally result in 1:1 AFL conduction.⁶ Exercise may also cause 1:1 AV conduction owing to both increased flutter cycle length and enhanced AV conduction.⁷ Our patient was neither on any medications, nor was able to identify any of the aforementioned factors, suggesting a predisposition to 1:1 AV conduction.

Although usually a non-life-threatening arrhythmia, AFL is a very common arrhythmia, which can lead to disastrous consequences if untreated. Hypotension, exacerbation of pulmonary congestion, initiation of impairment of myocardial perfusion and a tachycardia-mediated cardiomyopathy are some which have been reported.⁸ Symptoms that are commonly experienced by individuals with AFL include palpitations, dizziness, chest tightness,

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Figure 1 A 2:1 conducted atrial flutter (top), supraventricular tachycardia with rapid ventricular conduction about 280–300 bpm (bottom).

shortness of breath and fatigue. Emergency treatment is required in AFL with 1:1 AV conduction (1:1 AFL) as it can be associated with haemodynamic compromise owing to rapid ventricular response. It is sometimes difficult to differentiate this arrhythmia from rapid ventricular tachycardia or ventricular fibrillation; treatment decisions during these conditions could be tricky (figure 2). Important goals in treatment include adequate control of the ventricular rate, anticoagulation to prevent thromboembolic phenomenon and quick attempts to restore normal sinus rhythm.

We present a rare case of spontaneous 1:1 conduction of AFL in an otherwise healthy male, who was treated successfully.

Learning points

- ▶ Spontaneous conduction of 1:1 atrial flutter is a rare occurrence and it could be difficult to differentiate this arrhythmia from ventricular tachycardia or fibrillation.
- ▶ It is associated with significant symptoms and haemodynamic compromise.
- ▶ Common causes of facilitators of 1:1 conduction need to be ruled out.
- ▶ Treatment aims at ventricular rate control, anticoagulation and attempts at restoration of the normal sinus rhythm.

Figure 2 When the arrhythmia resolves, no pre-excitation is noted.

Competing interests None.

Patient consent Obtained.

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