CASE REPORT

Solving the puzzle of strong French coffee, palpitation and dizziness

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SUMMARY

A 38-year-old gentleman presented to the emergency department at the University Hospital in Geneva with nausea, rapid palpitation and presyncope. This was followed by a poor night's sleep, a day of strenuous walking in the city and drinking a large quantity of strong French coffee. 12-lead ECG revealed tachycardia with slightly increased QRS duration of right bundle branch block pattern and left axis deviation. Without the electrophysiological (EP) study, the patient was diagnosed with supraventricular tachycardia. On return to Edinburgh, he was investigated under the EP study, which confirmed fascicular tachycardia, a rare and uncommon presentation of ventricular tachycardia. The patient was successfully treated with radiofrequency catheter ablation therapy, which is curative in over 80% of the cases. This case highlights the importance of referring patients with repeatedly presenting arrhythmic episodes to undergo EP study. This will avoid putting them at unnecessary future risk, while offering the opportunity to definitely diagnose and provide curative therapy.

BACKGROUND

Fascicular tachycardia is a rare form of ventricular tachycardia (VT) which originates in the His-Purkinje system, causing an unusually rapid ventricular activation, which is often misdiagnosed as supraventricular tachycardia (SVT). While it is well described in the textbooks, there are a limited number of reported cases in the literature and critically, it can often be missed in the emergency setting.¹ The main factors that result in it being misdiagnosed as SVT, is due to only borderline prolongation of QRS duration (100–140 ms) on ECG,^{2,3} its responsiveness to intravenous verapamil,³ and its occurrence in structurally normal hearts in young men.⁴ Nevertheless, it is important that it is correctly diagnosed in order to provide the most appropriate treatment. The electrophysiological (EP) study is helpful in providing diagnostic and therapeutic aid to patients who present with attacks on repeated occasions and unnecessarily as demonstrated by this patient we present.

CASE PRESENTATION

A 38-year-old man presented with rapid palpitation and presyncope. This was triggered by a strong drink of coffee and strenuous outdoor walking. He had experienced a similar episode 12 months earlier. He is a regular coffee drinker, a non-smoker, a drinker of less than 10 units of alcohol per week, and does not use illicit drugs. He is not on regular medication. On examination pulse was 60 bpm, blood pressure 130/76 mm Hg, and temperature 37.1°C,

measured by an electronic device. He had no other cardiac or systemic signs. There is no other relevant history and the examination was otherwise unremarkable. There is a family history of stroke in both the parents.

INVESTIGATIONS AND TREATMENT

Delays resulted in an ECG being performed 3 h later which revealed a tachycardia of 220 bpm and the patient was taken to the emergency room. The tachyarrhythmia was missed by the electronic device measuring the pulse. ECG revealed a narrow complex tachycardia (figure 1).

On return to the UK, the patient was referred to an electrophysiologist at the Royal Infirmary of Edinburgh. Transthoracic echocardiography revealed no structural abnormality and preserved ventricular function. To further determine the nature of the patient's arrhythmia, an elective electrophysiology study was planned. This procedure involves insertion of electrode catheters into the heart via the femoral vein. Catheters can be placed at several sites within the heart to examine the electrical activation sequence of cardiac tissues in sinus rhythm, during provoked arrhythmia and during pacing manoeuvres. Once the arrhythmia mechanism has been determined, it is often possible to ablate an arrhythmia focus or a critical zone within a re-entry circuit to prevent future arrhythmia. Radiofrequency current is the most commonly utilised form of energy delivery, using resistive heating to ablate cardiac tissue at temperatures between 47°C and 65°C.

Electrophysiological testing did not confirm the patient's previous diagnostic label of SVT. There was no evidence of an accessory pathway, or of dual AV nodal conduction, which form the substrates for atrioventricular re-entry or AV nodal re-entry, the two most common forms of SVT. Atrial tachycardia could not be induced. Using programmed ventricular stimulation, in the presence of intravenous isoprenaline, VT was induced, with a rate of 220 bpm, right bundle branch block QRS morphology and deeply negative QRS complexes in the inferior leads. A diagnosis of the left posterior fascicular tachycardia was made. After confirming the diagnosis, catheter ablation was delivered at the point of convergence of fascicular and ventricular potentials, and rendered the tachycardia non-inducible. At one year of follow-up the patient is well with no further symptoms.

DIFFERENTIAL DIAGNOSIS

Fascicular VT is misdiagnosed frequently as SVT, mainly due to narrow QRS complexes, response to

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Figure 1 ECG revealed a narrow complex tachycardia.

verapamil, and presence in young men with structurally normal hearts. However, careful analysis of surface ECG can sometimes demonstrate VA dissociation. Sometimes, EP study can cause entrainment and induction can occur via atrial stimulation causing incorrect diagnosis of SVT.

OUTCOME AND FOLLOW-UP

The patient fully recovered, and was asymptomatic at 12-month follow-up.

DISCUSSION

Introduction and history

Idiopathic fascicular VT was first described in 1979 by Zipes *et al*,⁵ as an arrhythmia with relatively narrow QRS complex, right bundle branch block morphology and left axis deviation. In 1981, Belhassen *et al*⁶ showed that intravenous verapamil was successful in reducing the rate and preventing reoccurrence of this condition. Hence, Fascicular VT is also called Belhassen VT, and verapamil-sensitive VT. Fascicular VT most commonly presents with narrow QRS complex, right bundle branch block morphology and left axis deviation, but can present in two other forms. In most cases, the pathophysiology is thought to involve re-entry in the region of the posterior fascicle of the left bundle branch.⁷ Since the re-entry circuit is verapamil sensitive, it responds either to intravenous verapamil therapy, as well as radiofrequency ablation therapy, which is now considered as the first-line treatment. While 90% of all VT's occur in anatomically abnormal hearts, fascicular VT occurs in normal hearts, hence the name idiopathic fascicular VT. It appears to present more commonly in men (60–80%), between the ages of 15 and 40, and more frequently on exercise, as in our patient.⁸ Idiopathic fascicular VT can be classified into three subtypes,⁹ including (1) left posterior fascicular VT with left axis deviation and a right bundle branch block pattern; (2) left anterior fascicular VT with right-axis deviation and a right bundle branch block pattern and (3) upper septal fascicular VT with normal axis and right bundle branch block pattern. It should be noted however,

that rare cases of normal axis and left bundle branch block (precordial R wave transition between V3 and V4) have been reported.¹⁰ Nevertheless, so far the most common form is that of the posterior fascicular type, which accounts for almost 90% of cases.¹¹ This pattern can be observed in our patient, as shown in the 12-lead ECG (figure 2).

Clinical features

The diagnosis of fascicular tachycardia can be very difficult in the emergency setting. Patients are usually healthy young or middle aged men, with no evidence of anatomical heart disease, and the arrhythmia can mimic SVT and VT. However, fusion and capture beats on ECG help to suggest a diagnosis of VT. The QRS duration is only marginally increased at 100–140 ms. The RS interval is consistently <80 ms, compared with VT in anatomical heart disease, where it is commonly >100 ms.

Treatments and pitfalls

The pharmacological treatment of choice is intravenous verapamil. Moreover, recurrence of fascicular tachycardia can be prevented by long-term oral therapy of verapamil.¹² Therefore, one must be wary that the efficacy of this treatment should not necessarily lead to a diagnosis of SVT. There are reports that amiodarone and sotalol may also be effective,¹³ although adenosine, lignocaine and propranolol have been shown to have no effect.¹⁴ Despite the efficacy of verapamil, radiofrequency catheter ablation using conventional mapping techniques is now considered as the first-line therapy of choice for patients with fascicular tachycardia. The success rate is around 80%, and complications are thought to be rare.

SUMMARY

Idiopathic fascicular tachycardia is a VT that is sometimes confused with SVT in terms of ECG and clinical presentation.⁴ In this case, the patient had presented repeatedly to several different clinical centres before the diagnosis of fascicular tachycardia

Figure 2 ECG of posterior fascicular ventricular tachycardia.

was finally made. Fascicular tachycardia may be confused with an aberrantly conducted SVT, as the QRS complexes during tachycardia are not as broad as in other forms of VT. This is principally because the tachycardia complexes are propagated via the rapidly conducting His-Purkinje system rather than more slowly conducting myocardial tissue. Idiopathic fascicular tachycardia may be more prevalent than presently thought in clinical practice and current literature.¹ This highlights the advantage of the referral of new suspected cases of paroxysmal SVT or fascicular tachycardia to a specialist electrophysiologist. Ablation therapy offers a success rate of greater than 90% for SVT and around 80% for fascicular tachycardia; a significant figure considering fascicular tachycardia is a form of VT that is potentially curative.^{15 16} For most of the patients catheter ablation is preferable to lifelong prophylactic drug therapy.

Learning points

- Fascicular tachycardia is a rare form of ventricular tachycardia (VT) that can easily be missed in the emergency setting, and misdiagnosed as supraventricular tachycardia.
- There are three types of fascicular tachycardia, but in 90% of cases, it presents with a posterior fascicular origin, showing right bundle branch pattern with left axis deviation.
- Although fascicular tachycardia is very sensitive to verapamil, radiofrequency catheter ablation is the first-line treatment. Unlike in other forms of VT, ablation offers a high chance of cure.
- It is important for physicians to know when to refer patients who have suffered from repeated arrhythmic attacks for an electrophysiological study wherever possible to definitively diagnose and offer curative therapy, and avoid placing them at unnecessary risk.

Competing interests None.

Patient consent Obtained.

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