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Young patient with curious preexcitation: Ready to fly before catheters placement



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A 19-year-old man was referred for electrophysiological study (EPS) due to manifest pre-excitation found on an ECG performed before entering the aviation academy (Fig. 1A). The patient was a regular athlete and had never suffered from cardiac symptoms. Transthoracic echocardiogram revealed no structural heart disease and blood test results were within normality values. During the preprocedural peripheral vein cannulation, the patient complained of dizziness, sweating and general malaise. The episode was labelled as a neurally-mediated vagotonic reaction and an ECG was obtained (Fig. 1B).

1. Interpretation

The first ECG (Fig. 1A) shows sinus rhythm with a short (105 ms) PR interval and a slurred initial part of the QRS complex suggesting ventricular preexcitation through a right superoparaseptal accessory pathway (positive delta wave in inferior leads and V3 whilst negative in V1). Second ECG (Fig. 1B) obtained during vasovagal reaction shows progressive sinus bradycardia and prolongation of the PR interval, despite which the degree of pre-excitation remained constant, until a P wave blockade. This finding strongly suggests the existence of a fasciculoventricular accessory pathway (FVAP).

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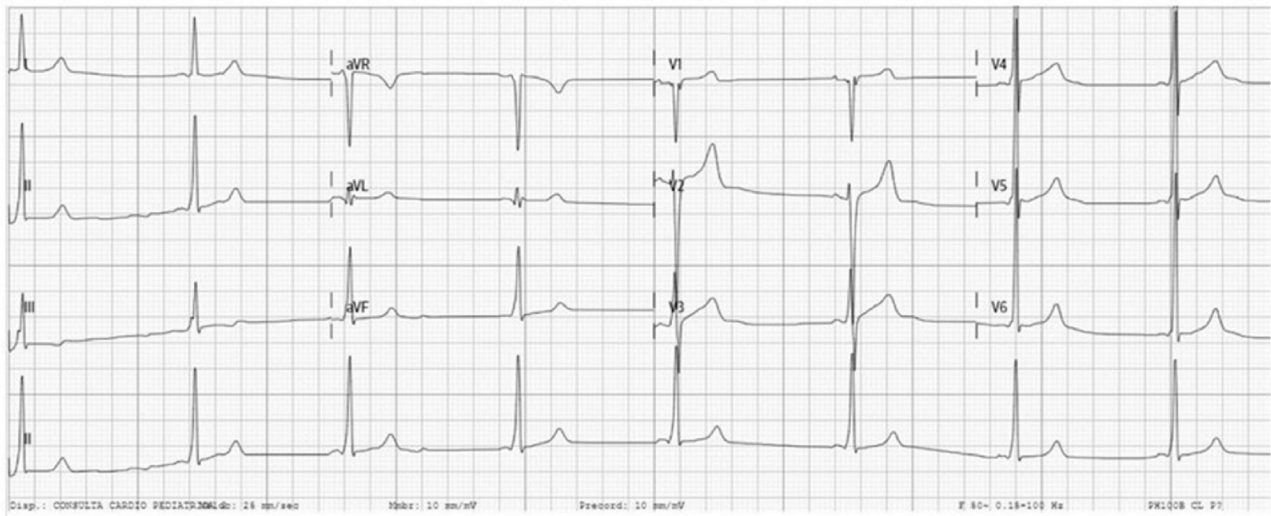
2. Clinical course

An EPS was performed in order to confirm FVAP diagnosis and to exclude the presence of other potential accessory pathways (AP) that has been referred in this type of cases. Basal HV interval was 24 ms. Programmed atrial stimulation (from coronary sinus) was performed. Using rapid atrial bursts, Wenckebach phenomenon was observed at 350 ms cycle length. Progressive PR interval prolongation was observed whereas the degree and morphology of preexcitation persisted unvaried (Fig. 2A), a behaviour non compatible with typical atrioventricular AP. Isoprenaline was administered to enhance AV node conduction. Then, programmed atrial stimulation with a basic cycle length of 450 ms and a single extrastimulus, revealed an anterograde effective refractory period (ERP) of the AP of 230 ms (Fig. 2B). During the basic cycle length stimulation, and up to a coupling interval of 240 ms, PR prolongation and unchanged preexcitation were also present. Adenosine was administered (12 mg) showing a progressive increase on PR interval until a P wave block appeared. Once again, despite PR prolongation, HV interval and delta wave remained unaltered (Fig. 3).

Concentric and decremental ventriculoatrial conduction was observed during right apex stimulation, suggesting the use of the AV node as the retrograde to access the atria.

The procedure was concluded with a final diagnosis of single FVAP, and the patient was discharged the next morning. Today, remains asymptomatic and, after medical certification of good health, was able to enter de national flight academy.

A) Ambulatory ECG



B) ECG during vagotonic reaction



Fig. 1. Electrocardiographic recordings. A) Basal ECG. B) Ecg obtained during vasovagal reaction.

3. Discussion

Fasciculoventricular are extremely uncommon atypical accessory pathways (less than 1%) [1] that connect the His bundle to the surrounding anteroseptal myocardium. They can be understood as “leaks” on the insulating fibrous sheath of connective tissue that surrounds the conduction system at the His or infra-His level.

The gold standard technique for their diagnosis is EP study.

However, it can be established based on electrocardiography with the help of vagal maneuvers or adenosine test [2].

The main electrocardiographic features of FVAP are a minimal pre-excitation pattern, with a low-amplitude delta wave suggestive of anteroseptal location (frontal plane axis between 0 and 75°, and precordial RS transition in leads V₂–V₃) and normal or slightly decreased PR interval (usually >110 ms), in contrast to anteroseptal APs, which present with significant shortening of the PR interval.

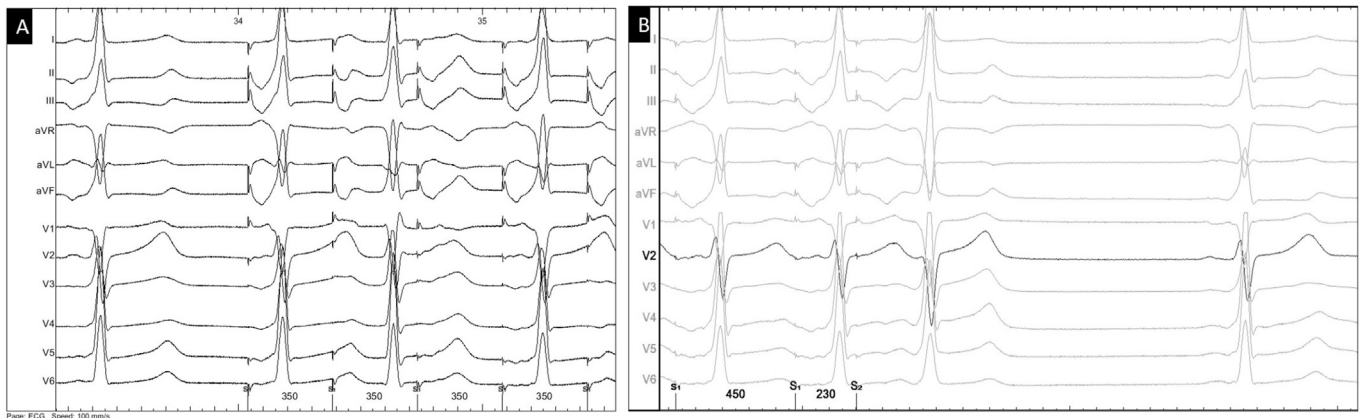


Fig. 2. A) Wenckebach phenomenon during rapid (350 ms) atrial stimulation. PR prolongs with no variation observed on preexcitation. B) Antegrade ERP of the accessory pathway. A subtle change in QRS is observed, best seen in V2 (highlighted).

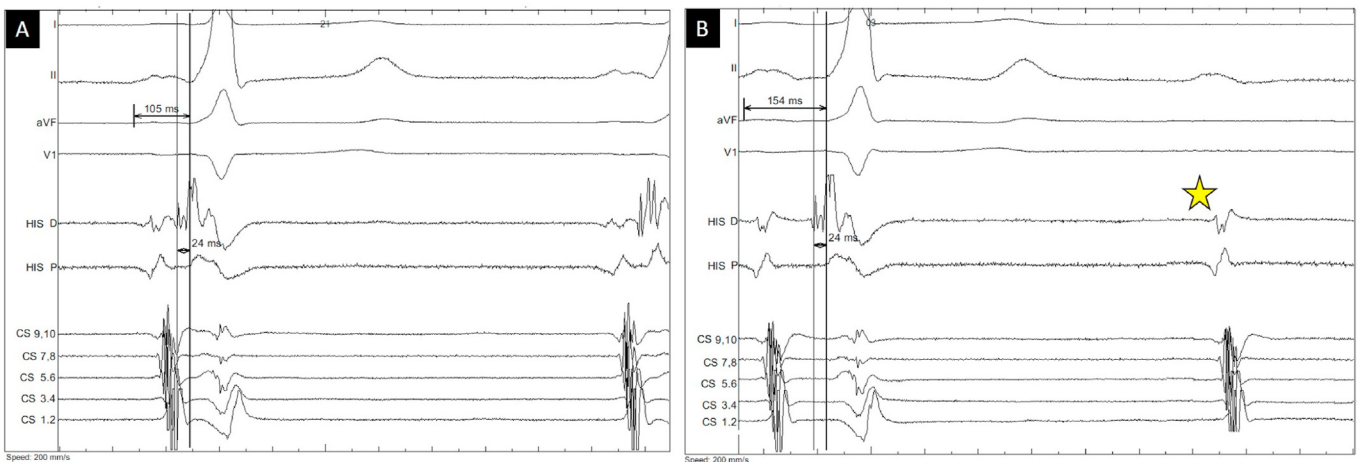


Fig. 3. A) PR and HV intervals in sinus rhythm. B) With adenosine infusion, PR prolongation with unchanged HV interval and delta wave morphology were observed. Yellow star marks a blocked P wave.

Several ECG findings in V₁ support the presence of a FVAP over an anteroseptal AP, including an R-wave width of less than 35 ms, an S-wave amplitude less than 20 mm, and notching in the descending limb of the S-wave [3]. Even though a diagnosis of FVAP can be made non-invasively, it is suggested the performance of an EPS, since they appear frequently with other arrhythmic substrates [4,5]. Key features of FVAP in EPS are a maintenance of the degree of pre-excitation despite the site of atrial stimulation and also when performing incremental atrial pacing even though a prolongation in the P-delta interval could be found. His bundle pacing will also maintain the presence of delta wave and short S–V interval [1].

Respecting their clinical significance, these pathways are asymptomatic, uncommon and thus, probably underdiagnosed. No participation of FVAP in reentrant circuits has been described [5]. Moreover, as these pathways are purely infranodal structures, there is no risk of rapid antegrade conduction during atrial tachycardias [1,3].

Wolff-Parkinson-White and other preexcitation syndromes represent a condition that in most countries precludes access to determinate high-risk professions such as state security forces (particularly aviation academies), until an ablation of the accessory pathway has been performed.

In asymptomatic patients with manifest ECG preexcitation, EPS-guided ablation strategy is recommended, especially in the setting of high-risk occupations and competitive athletes [6,7]. Catheter ablation is recommended in patients with asymptomatic pre-excitation but high-risk properties, such as shortest preexcited R-R interval during atrial fibrillation ≤ 250 ms, ERP of the AP ≤ 250 ms, multiple APs or induction of AP-mediated tachycardia [7].

However, correct identification of a FVAP is important as they represent just ECG or EPS curiosities that do not require treatment, which, if wrongly indicated, can cause serious damage to the conduction system given its location close to the His bundle.

4. Take home messages

- Preexcitation syndromes involve an increased risk of supraventricular arrhythmias and even sudden cardiac death. Thus, access to high-risk professions as security forces or aviation is usually prohibited until ablation of the accessory pathway has been performed.
- FVAP are an infrequent subtype of accessory pathways that are mere ECG curiosities not linked to an increased arrhythmic risk. Thus, ablation is not indicated.

- Special care must be taken with misdiagnosis, as performing ablation near the His bundle area may cause serious complications as complete atrioventricular block.

Declaration of competing interest

None reported.

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