Case Report

Paroxysmal Atrial Fibrillation of Vagal Mechanism with Episodes of Wide QRS Complex Tachycardia Due to Gouaux-Ashman’s Phenomenon

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ABSTRACT: A 38-year-old male patient consulted for nocturnal palpitations described as fast chest pounding that woke him up from sleep. A physical examination yielded no remarkable findings. A 24-hour Holter ECG monitoring demonstrated nocturnal episodes of paroxysmal atrial fibrillation (PAF) with the coexistence of wide QRS complex tachycardia. To the best of our knowledge, this is the first reported case of nocturnal episodes of wide QRS complex tachycardia during vagally mediated PAF resulting from Gouaux-Ashman’s phenomenon. It is paramount for general physicians to recognize this phenomenon because it should be differentiated from ventricular tachycardia, since prognosis and treatment of both entities are entirely different. General and emergency physicians should be aware in order to improve adequate diagnostic and therapeutic management of the arrhythmic episodes.

KEYWORDS: Gouaux-Ashman phenomenon; Paroxysmal atrial fibrillation; Wide QRS complex tachycardia; Vagally-mediated atrial fibrillation; Holter ECG monitoring.

Introduction

Gouaux-Ashman’s phenomenon is an aberrantly conducted supraventricular beat with wide QRS complex due to changes in refractoriness within the specialized conduction system according to the preceding cycle length.

It is usually responsible for isolated wide QRS complex beats during atrial fibrillation (AF) [1-3].

The electrocardiogram (ECG) pattern actually known as Ashman phenomenon was first described by Lewis in 1910, [1] and later reported by Gouaux and Ashman in 1947 [4].

The Gouaux-Ashman phenomenon is typically seen during AF when a relatively long cycle beat is followed by a relatively short cycle.

Due to the wide QRS complex of the tachycardia episodes, it may be misdiagnosed as ventricular tachycardia.

Therefore, we are reporting this case of nocturnal episodes of wide QRS complex tachycardia during vagally-mediated paroxysmal atrial fibrillation (PAF) resulting from Gouaux-Ashman’s phenomenon.

It is paramount for physicians to recognize this phenomenon because it should be differentiated from ventricular tachycardia, since prognosis and treatment of both entities are entirely different.

General and emergency physicians should be aware in order to improve adequate diagnostic and therapeutic management of the arrhythmic episodes.

Case Report

A 38-year-old male patient presented to the cardiology consult for nocturnal palpitations described as chest pounding and fast heart beats that woke him up from sleep.

A physical examination yielded no remarkable findings.

Auscultation of the heart showed no murmurs, rubs, or gallops.

Lung auscultation was clear.

There was no lower limb edema.

The neurological examination was also normal.

The patient’s vital signs were within normal limits.

Results from chest x-rays, and laboratory blood tests analysis were unremarkable.

Thyroid hormones were also within normal limits.

A conventional 12-leads ECG showed sinus rhythm with a heart rate of 72bpm within normal limits (Figure 1).
Figure 1. 12 leads conventional electrocardiogram within normal limits showing sinus rhythm at 72 beats per min.

Figure 2. Transthoracic echocardiography showing normal diameter of the left atrium.

The echocardiography was entirely normal showing no signs of organic heart disease. The left atrium showed normal diameter (Figure 2).

A 24-hour ambulatory Holter ECG monitoring was obtained showing several nocturnal episodes of bradycardia-associated PAF that lasted from 23:42 pm to 06:26 am while the patient was asleep (Figure 3).

Figure 3. 24-hour ambulatory Holter ECG monitoring showing several nocturnal episodes of bradycardia-associated paroxysmal atrial fibrillation that lasted from 23:42 pm to 06:26 am (black arrows showing the beginning and termination) while the patient was asleep.
The Holter ECG also revealed the coexistence of unsustained wide QRS complex tachycardia of 6 or more beats during PAF (Figure 4).

![Figure 4. The 24 hour Holter ECG monitoring tracing shows the beginning (black arrow) of one of the several nocturnal episodes of wide QRS complex tachycardia clearly showing the pattern of short-long-short cycle length preceding aberrancy generating the wide QRS complex tachycardia.](image)

A closer look and more detailed analysis of the Holter ECG recordings allowed suspecting aberrancy given the fact that the wide QRS complex tachycardias were always preceded by short-long-short cycle lengths sequences and the wideness of the QRS varied depending on the duration of the prior pause.

Since the patient was very symptomatic, and complained about nocturnal palpitations, and fast heart beats that woke him up from sleep, he was given propafenone 600mg daily with clear amelioration of symptoms.

A written informed consent had been signed by the patient for publication of these data in accordance with the Declaration of Helsinki.

**Discussion**

The irregularity of the R-R Interval during AF provides the opportunity for a variation of cycle lengths.

The Gouaux-Ashman phenomenon is typically seen during AF when a relatively long cycle beat is followed by a relatively short cycle.

To the best of our knowledge, our present clinical study is the first reported case of nocturnal episodes of wide QRS complex tachycardia resulting from Gouaux-Ashman’s phenomenon.

The differential diagnosis of this phenomenon should be established with ventricular tachycardia.

The 24 hour Holter ECG tracing depicted in our Figure 4 shows the beginning (black arrow) of one of the several nocturnal episodes of wide QRS complex tachycardia.

The first wide QRS complex occurred with a cycle length of 312ms, which was preceded by a long cycle length of 408ms.

The R-R Interval preceding this latter long cycle measured 288ms, clearly showing the pattern of short-long-short cycle length preceding aberrancy generating the wide QRS complex tachycardia.

The four features of the Fisch criteria for the diagnosis of Gouaux-Ashman phenomenon was fully accomplished in our patient, namely, a relatively long cycle immediately preceding the short cycle generating the aberrant QRS complex; bundle branch block-pattern aberrancy with normal orientation of the initial QRS vector; irregular coupling of aberrant QRS complexes; and lack of a fully compensatory pause [2].

The 24 hour Holter ECG recording performed in our patient demonstrated the presence of a clear-cut nocturnal pattern of episodes of paroxysmal AF associated to bradycardia as depicted in Figure 3.

Vagal stimulation inhibits the hyperpolarization-activated inward current, and is strongly proarrhythmic.

Nocturnal-related bradycardia favors action potential prolongation developing early depolarizations.

Moreover, reduced inward current activity in nodal cells may alter the normal pacemaking capacity of cardiac cells.

It may prevent the sinus node from overdrive pacing, generating premature atrial contractions which facilitates in turn AF development [5].
A previous case report, [3] described an unsustained wide QRS tachycardia during permanent AF that differed in many ways from our present case.

They did not perform a 24 hour Holter ECG monitoring.

The mechanism of the permanent AF in their patient was probably related to atrial pathological alterations due to ischemic heart disease.

However, the Holter ECG monitoring in our younger patient without comorbidities demonstrated nocturnal, vagally-mediated episodes of PAF with wide QRS complex tachycardia due to Gouaux-Ashman phenomenon.

Conclusion

In cases of wide QRS complex tachycardia, aberrancy due to the Gouaux-Ashman’s phenomenon should be suspected in AF when there is a long cycle followed by a short cycle with subsequent wide QRS complex beats.

General and emergency physicians should be aware of this phenomenon to improve adequate diagnostic and therapeutic management of the arrhythmic episodes.

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Conflict of interests

None to declare.

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