Accelerated atrioventricular stimulation with an early and shortened ventricular repolarization in the same individual

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Abstract

LEARNING OBJECTIVE.
Raise awareness all cardiologists that this kind of problems in the heart's electrical system exist and must be carefully assessed.

ABSTRACT:

We will present a clinical condition characterized by the presence of a short PQ interval and a short QT interval in the same individual.

The Short PQ syndrome is characterized by a duration < 0.12 seconds. We know its variants.

The short QT syndrome has been described recently (2000-03). We speak of short QT if its length is < 0.350 second.

Both are known individually. However, there is an electrocardiographic pattern little known until today:

A pattern with short “PQ-interval and QT-interval” in the same ECG tracing.

Introduction

The QT interval is a reflection of ventricular repolarization (1-3). Its upper normal limits are well known, and the prolongation of QT interval above these limits, it is considered an independent risk factor for sudden death. There are many information on syndromes congenital and acquired long QT and its relationship to mortality (3-4). By contrasting, little is known about the causes and prognostic value of Short QT interval (5-7). It is difficult to know the index of this syndrome. Although only a few cases have been reported, the rate may be underestimated, because, until now, little attention has been focused on the diagnosis of short QT electrocardiogram (6-7). Patients with short QT syndrome have a wide clinical spectrum including palpitations, tachycardia, episodes of syncope and sudden cardiac death, and a family history of it through several generations. (5-6-7).

We have demonstrated the presence of this pattern in several persons with symptoms of childhood convulsions - diagnosed as epilepsy despite not display any epileptic focus on studies of electroencephalography (EEF) – as well as nocturnal tachycardia crisis and syncope events related to repetitive physical effort (8-9).

Electrical cardiac systole comprises:


In many cases, the determination of the end of the T wave is very difficult to calculate.

In Medicine and specifically in Cardiology, QT interval is a measure of time between the start of the Q wave and the end of the T wave (the heart's electrical cycle).

The presence of this configuration with a shortening of intervals PQ and QT represent a major cardiac instability, and consequently a high risk for serious cardiac arrhythmias (ventricular fibrillation fundamentally) and therefore also for sudden cardiac death (5).

Methods

A thorough compilation of patients with this kind of symptoms such as infantile convulsions non-responders to conventional treatments, bouts of nocturnal tachycardia with sudden character, and syncopal events related to the effort.

Exhaustive study of personal antecedents as well as your current clinical situation.


Case Report

A 37 old-years man with many nocturnal tachycardia crisis (since childhood) and three syncopal events observed and related with physical stress. In his family background, two sudden deaths were found: father died at age 55 sudden cardiac and a brother died at
22 months by sudden infant death.
He was diagnosed in his Reference Hospital (where he was transferred by emergency services) with supraventricular tachycardia to 150-170 beats per minute, with narrow QRS complexes. Severe diaphoresis, with paleness of skin and mucosa. A severe arterial hypotension to 90/50 mm. Hg. Cardiac auscultation was in normal ranges but with a rapid rhythm. Tachypnea to 20 cycles/minute. A grade Stuporous (Glasgow 15/15).

The neurological examination was within normal ranges without focalizations. Central and peripheral pulses were palpable, symmetric and synchronous in "frecuens".

Supraventricular tachycardia disappeared by means of the administration of two doses of Adenosine i.v. in bolus, with six mgrs. each one in 1 minute (Figure 2).

A Hospital discharge was made after full stabilizing of acute process and patient was derived to your cardiologist outpatient, with the follow diagnosis:

- A paroxysmal supraventricular tachycardia and Crisis of anxiety.

The patient was transferred to our Hospital because he had had a similar event as the exposed, after the first visit with his outpatient cardiologist.

There, the patient was adequately assessed with electrocardiogram, echocardiogram, blood levels of ions and cardiac markers as well as electro-physiological study (EEF). He was negative for high levels of Troponin (I-T), CK, CPK and however he was positive for a low levels of lithium ion (< 0.01 mcg)

In a detailed assessment on ECG, we can note that the patient has a short PQ- interval with a short QTc in the same ECG tracing (Bazett and Fridericia formulas) with a risk of sudden cardiac death, according to the Schwartz scale of 4.5 points: High risk for sudden cardiac death.

At first glance, the ECG tracing interpretation suggests a syndrome Lown - Ganong - Levine, but in a more detailed checkup we see as the QTc interval in the LGL syndrome is normal while in this patient, the QTc interval is short (< 0.350 s). We have therefore two possibilities: an unknown variant of LGL Syndrome or a new electrical cardiac disease.

Results

Both PQ and QT intervals are short.
PQ- interval: 0.10 - 0.11 seconds. RR interval: around 0.862- 0.900 seconds. QT- Interval: around 0.322-0.330 seconds. Bazett formula: around 0.339-0.343 seconds. Fridericia formula: around 0.330-.337 seconds.

Discussion

An electrical heart feature that has not been described at present with decreased duration of electrical cardiac systole: PQ and QTc-intervals are short (for some authors, it has been called "Breijo Pattern").

Conclusion

To reduce its more than likely underdiagnosis, all doctors should measure segments, intervals and waves electrocardiographic in all ECG tracings. A new electrical cardiac disease or pattern may have been discovered.

This described patient is not the only one in our collection, but just one example. Raising awareness among doctors of the existence thereof is prescriptive. Avoid preventable sudden deaths is the duty of all doctor, therefore knowledge of this characteristic electrocardiogram alongside clinical features patient should be a commandment.

References

Illustrations

Illustration 1

ECG image at first Hospital. Supraventricular tachycardia is evident.

Illustration 2

ECG was taken after administration of 12 mgs of Adenosine. Heart rate value is 67-68 beats per minute. Accelerated atrioventricular stimulation with an early and shortened ventricular repolarization. Can be seen a short PQ interval (<0.120 seconds) with an early and shortened ventricular repolarization (QTc <0.350. seconds).
Illustration 3

Detail on left leads (V4-V5-V6).

Illustration 4

Holter image. Same features than Figure 1. PQ-interval: around 0.100-0.110 seconds = Short PQ-interval. QTc (Bazzet) around 0.339-0.340 seconds (< 0.350 seconds) = Short QT-interval. QTc (Fridericia) around 0.332 seconds (< 0.350 seconds) = Short QT-interval.
Illustration 5

EEF Images. Seldinger technique.

Illustration 6

Stimulation of right atrial, atrioventricular node, His bundle and right ventricle were made. Basal intervals: AH about 67 milliseconds; HV about 33 milliseconds; LC about 870 milliseconds. With stimulation right ventricular apex in S1-S1 to 500 milliseconds, a dissociation VA was observed. Right atrial stimulation S1-S1 to 480 msec. was observed an antegrade Wenckebach phenomenon. Everything was annulled by autonomic blockade by means of atropine and smolol injections. There was not arrhythmia by administration of adenosine 12 mgs. A dissociation VA was confirmed, as well as an absence of accessory pathways.