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CLINICAL APPROACH TO EXTRASYSTOLES

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Abstract: Introduction: Extrasystoles (ES) are early beats usually originating from an ectopic focus. When the heart rhythm is regular, they appear before the time expected for the next systole, unlike escapes, which are late events. They are the most common arrhythmias and occur not only in cases of heart disease but also in normal people. Symptoms related to the manifestation of extrasystoles (ES) can be very uncomfortable or even disabling. Generally, such symptoms are noticed when the density of extrasystoles is high. Therefore, the current study aims to review the clinical approach to extrasystoles from diagnostic and therapeutic aspects, whose purpose is to propose a direction for these cases. **Methodology:** The first stage of the study consisted of establishing the most frequent extrasystoles based on the incidence in the scientific literature of its different types. Then keywords were defined in DeCs BVS. With these descriptors, articles and textbooks on arrhythmias were searched via Google Scholar and Scielo. Finally, a literature review of the main data related to diagnosis and management was carried out. **Results:** ES are classified under different aspects. The most common criterion considers the origin of ectopia. Thus, extrasystoles are classified as the supraventricular and ventricular. Despite these simple definitions, the differential diagnosis between ventricular and supraventricular extrasystoles is not always easy, because there are exceptions. **Conclusions:** Extrasystoles represent a spectrum of electrocardiographic changes, with or without clinical repercussions, which can confuse the diagnosis and clinical management of the attending physician. Synthetic review studies like this, therefore, play an important role in medical education and care, and must be encouraged in different sectors of medicine.

Keywords: Supraventricular

extrasystoles, Ventricular extrasystoles. Electrocardiographic findings. Management of Arrhythmias

INTRODUCTION

Cardiac tissue is composed of highly excitable cells capable of autonomous depolarization. However, physiologically, the sinus node triggers the stimulus by depolarizing faster, being followed by the atrial fibers and atrioventricular node and, finally, the bundle of Hiss and Purkinje fibers.

Cardiac Rhythm Disorders can characterize, from a clinical point of view, from asymptomatic situations to very serious ones, such as cardiac arrest. The main complication of a heart rhythm disorder is the decrease in effective cardiac output, a decrease that can be felt in several systems, four of which are of fundamental importance, as they imply greater morbidity and mortality.

Extrasystoles (ES) are early beats usually originating from an ectopic focus. When the heart rhythm is regular, they appear before the expected time for the next systole, unlike escapes, which are late events. They are the most common arrhythmias and occur not only in cases of heart disease but also in normal people.

Atrial extrasystoles (AE), for the most part, normally lead through the conduction system, configuring "QRS" complexes with a morphology most often similar to the basal Sinus Rhythm. As well as the ventricular ones, they can present themselves to the exam in an isolated way - single, or in bigeminism, trigeminism and so on. AEs are generally benign, as they are common in up to 60% of adults, without clinical repercussions or elevation of cardiovascular risk factors. In addition, it is related to everyday extra-cardiac causes, such as anxiety, stress, cigarettes, tea, coffee, decongestants, pregnancy, dehydration, among others.

Ventricular extrasystoles (VE) can result from the triggering of foci of ectopic or reentry automatism. These are depolarizations that appear in one of the ventricles before the next impulse from the sinus node. Conduction, because it is an ectopic focus, is slower, producing wide and varied QRS complexes and followed by compensatory pauses until the next P wave. the normal rhythm (bigeminism) or sporadically. If they appear in a number of 3 or more in a row, they are called non-sustained ventricular tachycardia (if they last for less than 30 seconds) or sustained (if they last for more than 30 seconds).

Symptoms related to the manifestation of extrasystoles (ES) can be very uncomfortable or even disabling. These are perceived as a sensation of "failure", palpitations, dyspnea, cough, dizziness, atypical chest pain and presyncope, affecting the quality of life of patients. Generally, such symptoms are noticed when the density of extrasystoles is high. Extrasystolic arrhythmias are directly related to the excitability of cardiac cells, being influenced by the balance of electrolytes in the intracellular fluid. The interaction between magnesium (Mg) and calcium (Ca) in regulating the permeability of nerves and muscle cells, and in the ATPase pump – Na+/K+ is of particular relevance.

Therefore, the current study aims to review the clinical approach to extrasystoles from diagnostic and therapeutic aspects, whose purpose is to propose a direction for these cases.

METHODOLOGY

The first stage of the study consisted of establishing the most frequent extrasystoles based on the incidence in the scientific literature of its different types. Then, keywords were defined in the DeCs BVS in "Supraventricular extrasystoles", "Ventricular extrasystoles", "Electrocardiographic findings"

and "Arrhythmia management". With these descriptors, articles and textbooks dealing with arrhythmias were searched via Google Scholar and PubMed.

Among the inclusion criteria, it was sufficient to address the extrasystoles of interest to the current review, without conflicting information between the materials. Studies with repetitive, controversial information or information not adhered to by current emergency protocols were excluded. There was no discrimination of time interval or origin of publication, but of quality of information from comparatives. Finally, a literature review of the main data related to diagnosis and management was carried out.

RESULTS

ES are classified under different aspects. The most common criterion considers the origin of ectopia. Thus, extrasystoles are classified as the supraventricular and ventricular. Supraventricular SSc have a narrow QRS or the same morphology as the basal sinus rhythm complexes. When the ectopic focus is ventricular, the stimulus does not travel along the bundle of His and its branches in the normal direction. As a consequence, the ventricular ES have an anomalous, widened and shifted QRS in their spatial orientation.

Despite these simple definitions, the differential diagnosis between ventricular and supraventricular extrasystoles is not always easy, because there are exceptions

ATRIAL EXTRASYSTOLES

These cases are represented, on the electrocardiogram, as an advance of a new QRS complex (narrow, that is, up to 120 ms) and morphological alteration of the P wave, which is present (figure 1).

VENTRICULAR EXTRASYSTOLES

Ventricular extrasystoles, also called premature ventricular contractions (PVCs), may occur irregularly or at predictable intervals (such as bigeminy or trigeminy). Existing ejection murmurs may be exacerbated due to increased cardiac filling and contractility after the compensatory pause.

It is also characterized by an advance of the QRS complex, but this time widened (greater than 120 ms) and without a P wave. It occurs when the atrioventricular node assumes the origin of the electrical impulse and, therefore, even if atrial depolarization (wave P), it tends to be camouflaged in the tracing by the QRS complex.

SPECIAL VENTRICULAR EXTRA-SYSTOLES

Ventricular bigeminism

It is a form of EV presentation that manifests as 1 ventricular extrasystole for every 1 sinus beat (Figure 3). It is not commonly related to sudden death, being characterized as benign.

Ventricular trigeminy

Ventricular trigeminism. Ectopic ventricular heartbeat in red (Figure 4).

Paired

It is the juxtaposition of 2 ventricular extrasystoles.

Non-sustained ventricular tachycardia

3 or more ventricular extrasystoles together (Figure 5). It is characterized as non-sustained if it lasts for less than 30 seconds and is hemodynamically stable.

Sustained ventricular tachycardia

3 or more ventricular extrasystoles together lasting longer than 30 seconds or hemodynamic instability (Figure 6) – this

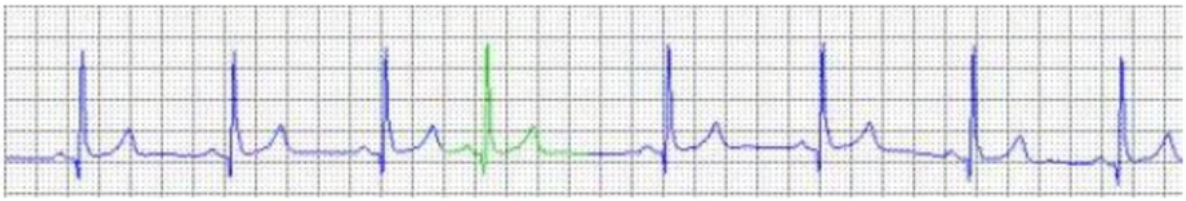

Figure 1. Atrial extrasystole.

Source: CASSIOLATO, José Luiz. Cardios, 2007.

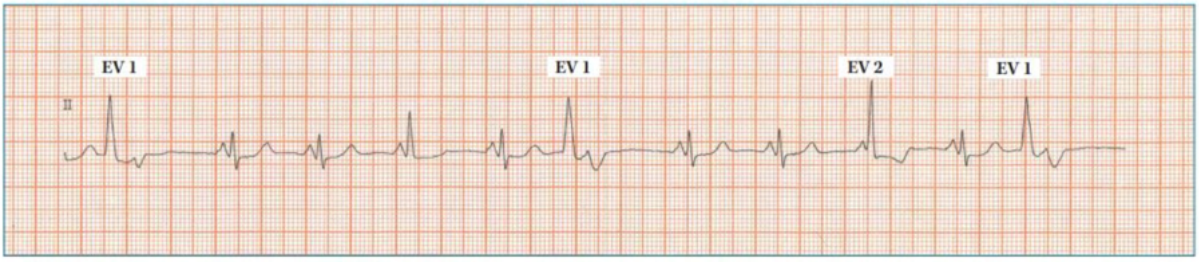

Figure 2. Excerpt of electrocardiogram (ECG) in lead DII. EV1 are ventricular extrasystoles not preceded by a P wave. EV2 is an extrasystole preceded by a P wave and has a wide QRS, but with an intermediate duration between EV1 and the sinus beat.

Source: FRIEDMANN, Antônio. Electrocardiology Service of the institution Hospital das Clínicas: Faculdade de Medicina da Universidade de São Paulo, 2016.

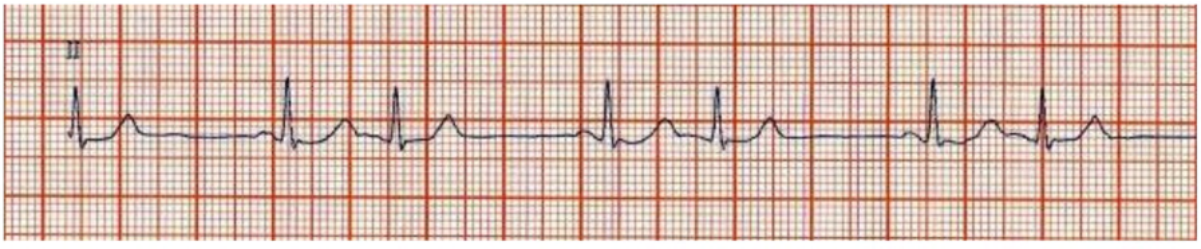

Figure 3. B - Ventricular bigeminism.

Source: CardioPapers, 2019.

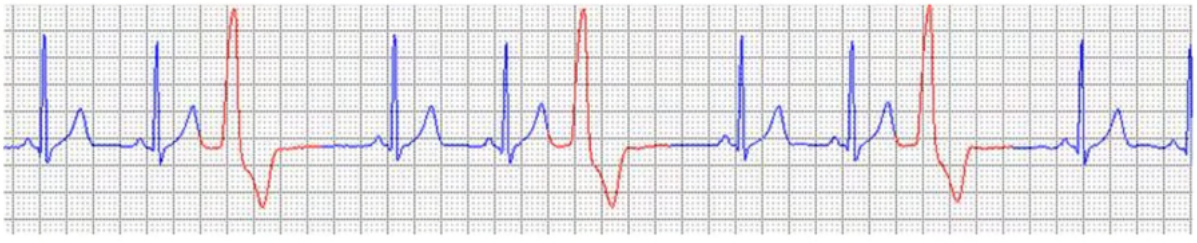

Figure 4. Ventricular trigeminism. Ectopic ventricular beat in red.

Source: Rhythm Control, accessed in 2022.

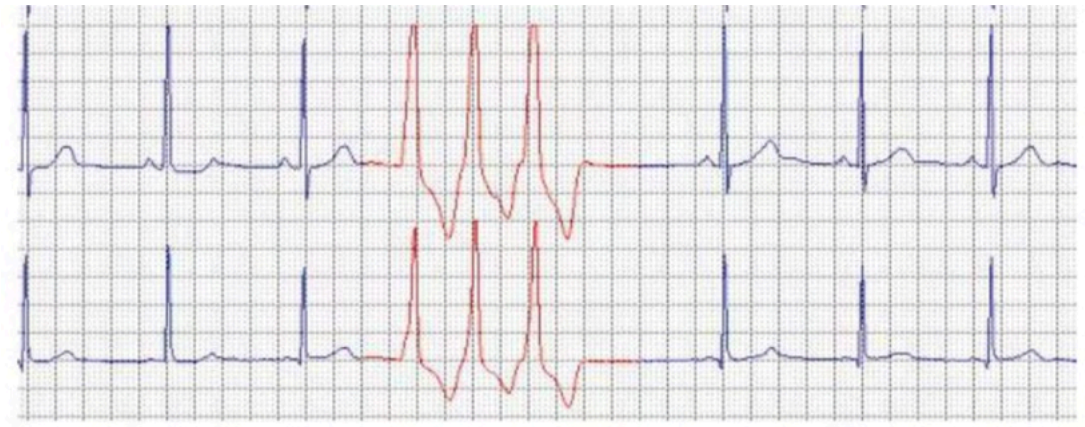

Figure 5. Non-sustained ventricular tachycardia. In red, 3 juxtaposed ventricular extrasystoles.
Source: CASSIOLATO, José Luiz. Cardios, 2007.

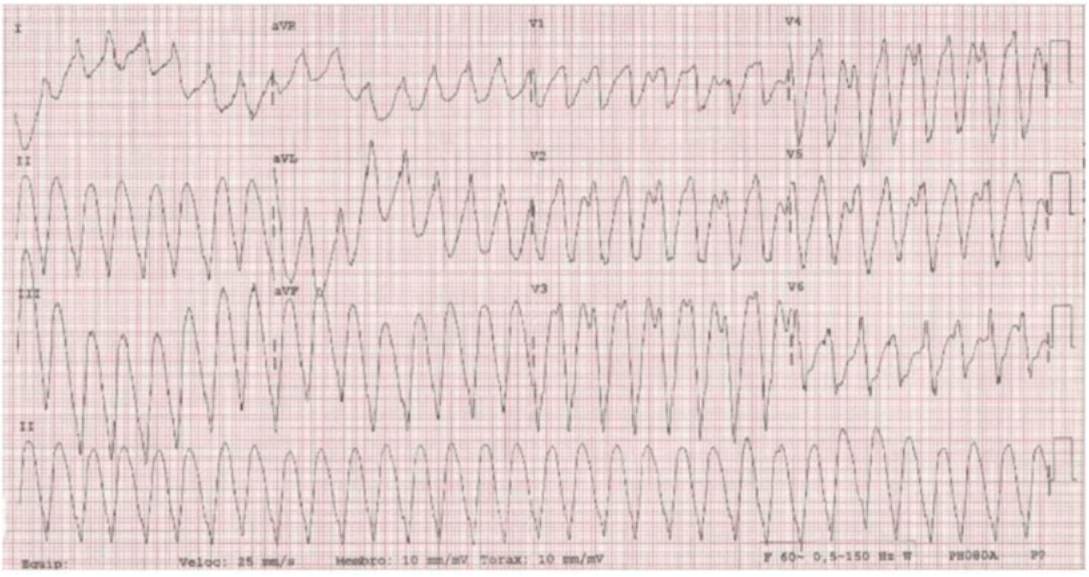

Figure 6. Sustained ventricular tachycardia.
Source: CardioPapers, 2019.

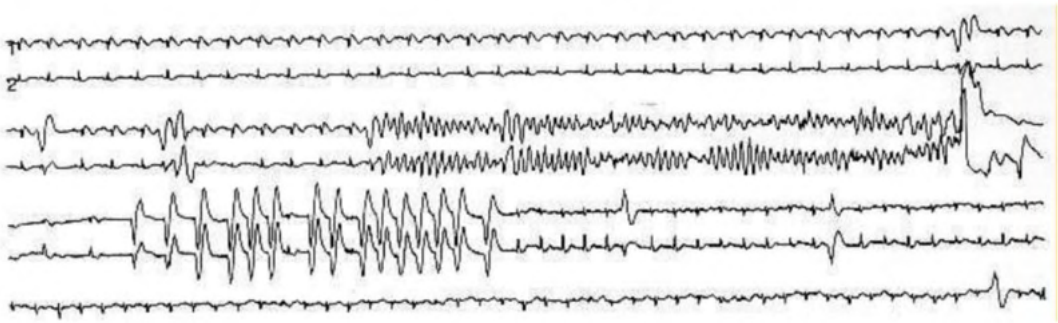

Figure 7. Polymorphic ventricular tachycardia characterized as Torsades de Pointes.
Source: CASSIOLATO, José Luiz. Cardios, 2007.

is recognized in the presence of signs of congestion, angina, hypotension and/or syncope.

Right Branch Block Pattern (BRD)

In a tachycardia with a BRD pattern, the presence in V1 of a monophasic QR or R complex suggests a ventricular focus. Lead V6 also provides important information in a tachycardia with a BRD pattern, with the R:S ratio <1, in favor of ventricular tachycardia (TV).

Left Branch Lock Pattern (BRE)

LBBB-patterned tachycardia is suggestive of VT if lead V1 has an initial positive deflection of the QRS complex for more than 30 ms, a jamming or notch in the descending phase of the S wave, and an interval from the beginning of the QRS to the nadir point of the wave. S of 70ms or more. In lead V6, a QR pattern in a LBBB-patterned tachycardia also suggests VT.

MONOMORPHIC

Type of ventricular tachycardia represented by QRS complexes of the same morphology.

POLYMORPHIC

Type of ventricular tachycardia represented by QRS complexes of different morphology. These are more associated with malignancy, with a risk of progression to cardiorespiratory arrest.

A great example is the Torsades de Pointes (Figure 7), which has an extended ventricular refractory period. That is, long QT interval (> 450 ms). Conditions that prolong this interval are well associated with a predisposition to sudden death.

Some causes are related to the adverse effect of an antiarrhythmic, hypokalemia, hypomagnesemia, hypocalcemia, use of chloroquine or azithromycin, atrioventricular blocks, among others.

CLINICAL MANAGEMENT

Supraventricular extrasystoles are not significant in individuals without heart disease and there is no need for treatment other than to avoid obvious triggers. Beta-blockers or ablation are offered only if symptoms are intolerable or if these extrasystoles are very frequent and, by inducing interventricular dyssynchrony, cause heart failure. Other antiarrhythmics that suppress ESV increase the risk of more serious arrhythmias.

As for ventricular extrasystoles, all unstable tachyarrhythmias must be reversed as quickly as possible, with synchronized electrical cardioversion (SVC). It is worth mentioning that the same current which depolarizes the myocardium also depolarizes all the thoracic skeletal muscles in its path, causing pain and discomfort to the patient, requiring analgesia and sedation.

In monomorphic ventricular tachycardia, start with 100 J of monophasic or biphasic and increase the dose progressively. In polymorphic, it must be treated with the same doses indicated in defibrillation, including not synchronizing the device.

In stable cases, sustained monomorphic VT can be treated with antiarrhythmics such as Amiodarone or Procainamide. Beta-blocker (or implantable cardioverter-defibrillator) prophylaxis must also be performed if the cause of the arrhythmia is not reversible.

In the case of Torsades de Pointes, Magnesium Sulfate must be used instead of Amiodarone. It is usually a non-sustained arrhythmia, alternating periods of torsades de pointes with sinus rhythm (long baseline QT). Due to the etiology itself, one must try not to use antiarrhythmics, treat associated electrolyte disturbances and discontinue potential triggering drugs (antiarrhythmics, quinolones, etc.). CVE is of little help due to the intermittent nature of the arrhythmia

(it reverses spontaneously, to re-enter). The administration of 2 g of magnesium sulfate and the passage of a temporary pacemaker to accelerate the baseline heart rate (even if the patient is not bradycardic) are the recommended measures.

CONCLUSIONS

Extrasystoles represent a spectrum of electrocardiographic changes, with or without clinical repercussions, which can confuse the diagnosis and clinical management of medical care. It is important to highlight that most patients with SSc do not need any specific treatment. After an initial specialized evaluation, if the condition is benign, the individual must be released for a normal life. In this group are asymptomatic, without structural heart disease and with low SS density on 24-hour Holter.

In this sense, the early recognition of its manifestation is capable of modifying the patient's prognosis, since he can present from a probably benign atrial extrasystole to a malignant Torsades de Pointes phenomenon. Review studies like this play an important role in medical education and care, and must be encouraged in different sectors of medicine.

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