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REVIEW ARTICLE

The value of electrocardiography for differential diagnosis in wide QRS complex tachycardia☆

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Abstract Correct diagnosis in wide QRS complex tachycardia remains a challenge. Differential diagnosis between ventricular and supraventricular tachycardia has important therapeutic and prognostic implications, and although data from clinical history and physical examination may suggest a particular origin, it is the 12-lead surface electrocardiogram that usually enables this differentiation.

Since 1978, various electrocardiographic criteria have been proposed for the differential diagnosis of wide complex tachycardias, particularly the presence of atrioventricular dissociation, and the axis, duration and morphology of QRS complexes. Despite the wide variety of criteria, diagnosis is still often difficult, and errors can have serious consequences. To reduce such errors, several differential diagnosis algorithms have been proposed since 1991. However, in a small percentage of wide QRS tachycardias the diagnosis remains uncertain and in these the wisest decision is to treat them as ventricular tachycardias.

The authors' objective was to review the main electrocardiographic criteria and differential diagnosis algorithms of wide QRS tachycardia.

PALAVRAS-CHAVE
Taquicardia de QRS largos;
Taquicardia ventricular;
Taquicardia supraventricular;
Algoritmos;

Taquicardia de QRS largos – importância eletrocardiográfica no diagnóstico diferencial

Resumo O diagnóstico correto de taquicardia de complexos largos permanece um desafio. A sua diferenciação entre taquicardia supraventricular e taquicardia ventricular tem grandes implicações terapêuticas e prognósticas e, embora alguns dados na história clínica e no exame físico nos possam sugerir uma determinada origem, é o eletrocardiograma de 12 derivações que permite habitualmente essa diferenciação.

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Critérios;
Diagnóstico diferencial;
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Desde 1978, diversos critérios eletrocardiográficos têm sido propostos para o diagnóstico diferencial das taquicardias de complexos largos, nomeadamente a presença de dissociação aurículo-ventricular e a duração, o eixo e a morfologia dos complexos QRS. Apesar da grande diversidade de critérios, o diagnóstico revela-se frequentemente difícil, originando erros com consequências gravosas. Para diminuir a probabilidade de erros foram introduzidos desde 1991 vários algoritmos de diagnóstico diferencial. Contudo, apesar de os vários critérios e algoritmos de diagnóstico, continua a existir uma pequena percentagem de taquicardias de QRS largos que mantêm um diagnóstico incerto e em que o mais sensato é tratar como se fossem taquicardias ventriculares.

O objetivo dos autores foi rever os principais critérios e algoritmos eletrocardiográficos de diagnóstico diferencial de uma taquicardia de QRS largos.

Introduction

Wide QRS complex tachycardia is defined as a heart rate of >100 bpm and QRS duration of >120 ms. It may be of supraventricular or ventricular origin, and differential diagnosis between the two has important therapeutic and prognostic implications.

In the absence of a pacemaker rhythm, there are three possibilities to consider in wide QRS tachycardia (Figure 1):

(A) supraventricular tachycardia (SVT) with bundle branch block (BBB). BBB may be pre-existing or can occur when the refractory period of one of the bundle branches is reached because of the heart rate of the SVT, or due to retrograde invasion in one of the bundle branches.[1] These causes of BBB can be found in patients with atrial tachycardia (AT), atrial flutter, atrial fibrillation (AF), atrioventricular (AV) nodal reentrant tachycardia or orthodromic AV reentrant tachycardia with AV conduction over the AV node and ventriculoatrial (VA) conduction over an accessory pathway;
(B) SVT with AV conduction via an accessory pathway. This may occur during AT, atrial flutter, AF, AV nodal reentrant tachycardia (less frequently), or antidromic AV reentrant tachycardia with AV conduction over an accessory pathway and VA conduction over the AV node or a second accessory pathway;
(C) ventricular tachycardia (VT).[2]

Data from clinical history and physical examination may help identify the origin of the arrhythmia. VT is the most common cause of wide QRS tachycardia (around 80% of cases),[3] and is strongly suggested by a history of heart disease (myocardial infarction [MI] or congestive heart failure), with a positive predictive value of 95%.[4] A history of similar episodes in recent years suggests SVT.[5]

Physical findings that suggest AV dissociation, such as cannon A waves in the jugular venous pulse, variable intensity of S1, or variable arterial pressure unrelated to breathing, point towards a ventricular origin.[6] On the other hand, if the tachycardia can be terminated by maneuvers such as the Valsalva maneuver, this strongly suggests a supraventricular origin (although some types of VT such as fascicular VT can also be terminated by the Valsalva maneuver). Another important aspect of physical examination is hemodynamic stability, which is crucial for treatment in the acute phase. However, it should be borne in mind that, although VT is often accompanied by hemodynamic compromise, wide QRS tachycardia in a hemodynamically stable patient is not necessarily of supraventricular origin and that ultimately it is functional cardiac reserve that determines hemodynamic status in a patient with tachycardia, whether SVT or VT.

Correct diagnosis in wide complex tachycardia remains a challenge despite the numerous criteria for differentiating between VT and SVT. However, accurate diagnosis is essential for treatment both in the acute phase and in the medium to long term.

Electrocardiographic criteria for differential diagnosis of wide QRS tachycardia

The 12-lead surface electrocardiogram (ECG) is the most important tool for identifying the origin of tachyarrhythmias. Since 1978, various electrocardiographic criteria have been proposed for the differential diagnosis of wide complex tachycardias, most of them based on the presence of AV dissociation and the axis, duration and morphology of QRS complexes.

Importance of atrioventricular dissociation

P waves can be difficult to distinguish in wide QRS tachycardia, but they may be detectable dissociated from the QRS complex, especially in slow VT (Figure 2). Similarly, conduction from atria to ventricles may occasionally occur, resulting in capture or fusion complexes (Figure 3). Such evidence of AV dissociation is an indication of VT.

Duration of the QRS complex

QRS duration of more than 140 ms with right bundle branch block (RBBB), or of more than 160 ms with left bundle branch