

Early T Wave Inversion (Cardiac Memory Pattern)

Erken T Dalga Negatifliği (Kardiyak Hafıza Paterni)

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Abstract

A 32-year-old man was admitted to the coronary care unit because of wide QRS complex tachycardia. 12-lead electrocardiogram showed a monomorphic regular wide QRS complex tachycardia with a ventricular rate of 110 beats/minute and right bundle branch block morphology. The patient was received synchronized shocks at energy levels of 200 Joules with normal sinus rhythm. His electrocardiogram after the termination of the wide QRS complex tachycardia returned to sinus rhythm with T wave inversions in V1-V6 and DII, DIII, aVF. The indicated T-wave inversions demonstrate cardiac memory due to the preceding abnormal ventricular activation caused by tachycardia. Because the T wave inversion occurred after the conversion from tachycardia to sinus rhythm, it is illustrated by the cardiac memory phenomenon.

Key Words: Electrocardiography, Cardiac memory, Cardioversion

Özet

32 yaşında erkek hasta, geniş QRS kompleks taşikardi nedeniyle koroner yoğun bakım ünitesine yatırıldı. Oniki derivasyonlu elektrokardiogramda ventriküler hızın 110 vuru/dakika olduğu, sağ dal bloğu morfolojisinde, monomorfik özellikte ve geniş QRS kompleksli, düzenli bir taşikardi mevcuttu. Hastaya 200 joule enerji ile senkronize şok uygulandı ve normal sinüs ritmi sağlandı. Geniş QRS kompleks taşikardinin sonlanmasından sonraki elektrokardiogramda V1-V6 ve DII, DIII, aVF derivasyonlarında T dalga negatifliği mevcuttu. Ertesi gün T dalga negatifliği yalnızca DII, DIII, aVF derivasyonlarında görüldü. T dalgasının ters dönmesi, önceden var olan ventriküler taşikardiden dolayı anormal ventriküler aktivasyona bağlı kardiyak hafızayı göstermektedir. T dalgasının ters dönmesi sinüs ritminden önce ventriküler taşikardinin varlığından dolayı oluştuğu için kardiyak hafıza olayı olarak adlandırılmaktadır.

Anahtar Kelimeler: Elektrokardiografi, Kardiyak Hafıza, Kardioversiyon

Introduction

Cardiac memory is a phenomenon characterized by transient T-wave abnormalities occurring after the conversion cardiogram that is from tachycardia to sinus rhythm, it may be explained by the cardiac memory phenomenon. Cardiac memory is identified as an modified T wave on electrocardiogram and vector seen when sinus rhythm resumes after a period of abnormal myocardial activation.

Case Report

A 32-year-old man was admitted to the coronary care unit because of wide QRS complex tachycardia. On arrival to the coronary care unit the patient was not in acute distress. Blood pressure was 120/90 mmHg, heart rate was 110 beats/min and regular, and respiratory rate was 24 breaths/min. Her height was 170 cm and his weight was 90 kg. Cardiac examination revealed a regular tachycardia with normal S1 and S2, no S3, S4 or murmur was detected, and the lungs were clear to auscultation. Complete blood count, electrolytes (including calcium and magnesium), creatine kinase, and troponin I, all was within normal limits. A 12-lead electrocardiogram showed a monomorphic regular wide QRS complex tachycardia with a ventricular rate of 110 beats/min and right bundle branch block morphology (Figure 1).

Valsalva maneuver and carotid sinus massage had no effect on the tachycardia. The patient was received synchronized shocks at energy levels of 200 Joules with normal sinus rhythm. His electrocardiogram after the termination of the tachycardia returned to baseline with the indicated T wave inversions in V3-V6 and DII, DIII, aVF leads and QT was 360 msec in sinus rhythm (Figure 2A). The following day, the T-wave inversions seen only DII, DIII, aVF leads (Figure 2B). Transthoracic echocardiogram showed normal left ventricular size and ejection fraction was 50%. Careful examination of the right ventricle did not reveal any dysplasia. Coronary risk factors were absent (non-smoking, non-diabetic, no hyperlipidemia, no hypertension, or family history of cardiovascular diseases). Invasive testing by coronary angiography was, therefore, not performed.

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Figure 1. 12-lead electrocardiogram showed a monomorphic regular wide QRS complex tachycardia with a ventricular rate of 110 beats/min and right bundle branch block morphology.



Figure 2. (A) Note the marked T-wave inversions which, demonstrate cardiac memory due to the preceding abnormal ventricular activation caused by tachycardia. (B) The T-wave inversion in DII, DIII, aVF leads are shown.

Discussions

The electrocardiogram shows sinus rhythm with T-wave inversions, seen with slower rates with normal QRS duration, particularly in the precordial leads. The indicated T-wave inversions seen in Figure 2A-B demonstrates cardiac memory due to the preceding abnormal ventricular activation caused by tachycardia. Because the T wave inversion happened after the conversion from tachycardia to sinus rhythm, it may be explained by the cardiac memory phenomenon (1). Cardiac memory is identified as an altered T wave on electrocardiogram and vector cardiogram that is seen when sinus rhythm resumes after a period of abnormal myocardial activation (1,2). Cardiac memory has been described frequently in patients (3). Its rapid onset in humans is such that episodes of abnormal ventricular activation as short as 1 minute in duration may exert lingering effects on repolarization once normal ventricular activation has resumed (2,4).

In summary, cardiac memory is identified as altered T-waves when sinus rhythm resumes after a period of abnormal myocardial activation. Ventricular pacing or arrhythmias frequently induce cardiac memory and is associated with upright T-waves in Lead I and aVL, with narrow QRS morphology in contrast to the typically inverted T-waves during ischemia in these leads (5).

References

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