

McGinn and White sign in pulmonary thromboembolism

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RESUMEN

En 1935 McGinn y White describieron la imagen electrocardiográfica de SQ profunda y T invertida. La imagen de McGinn y White no es frecuente y se puede ver en 7-19% de los casos de embolia pulmonar. Una mujer de 70 años con adenocarcinoma de ovario fue admitida, auscultación S3 mostró ausencia de galope y complejo pulmonar Chávez. El electrocardiograma mostró taquicardia sinusal, patrón S1/Q3/T3, alteraciones difusas de la repolarización e hipocinesia de cavidades derechas, la ecografía Doppler mostró coágulos en el sistema venoso profundo y dilatación de electrocardiograma.

Palabras clave. Electrocardiograma. Embolismo pulmonar. Dilatación de cavidades derechas.

ABSTRACT

In 1935, McGinn and White described the electrocardiographic image of deep S Q and inverted T. The McGinn and White image is not frequent and can be seen in 7-19% pulmonary embolism cases. A 70-year-old woman with ovarian adenocarcinoma is admitted, S3 auscultation showed no gallop and Chavez pulmonary complex. The electrocardiogram showed sinus tachycardia, S1/Q3/T3 pattern, diffuse alterations in the repolarization and hypokinesia of right cavities, Doppler ultrasound showed clots in deep venous system and electrocardiogram dilation.

Key words. Electrocardiogram. Pulmonary embolism. Right cavities dilation.

INTRODUCTION

The electrocardiographic image of deep S in D1, deep Q in DIII and inverted T in DIII was described in 1935 by McGinn and White,¹ in a well-known article published in JAMA (Journal of American Medical Association), in which electrocardiographic alterations associated with acute Cor Pulmonale secondary to pulmonary embolism are described. In the publication, 9 subjects are described, 7 of them developed the electrocardiographic pattern and where in state of shock. The McGinn and White image is not frequent and can be seen in 7-19% of pulmonary embolism cases; it is associated with massive pulmonary embolism (occlusion of more than 50% of pulmonary circulation) and dilation of the right cavities.²

CLINICAL CASE

A 70-year-old woman with ovarian adenocarcinoma is admitted to the Intensive care unit with tachypnea, tachycardia and dyspnea. On auscultation, S3 was observed without gallop and Chavez pulmonary complex (reinforcement and split of S2 and palpable pulmonary closure). The electrocardiogram (EKG) showed sinus tachycardia, deviation of the axis to the right, S1/Q3/T3 pattern, incomplete right bundle block, 320 msec QT and diffuse alterations in the repolarization (Figure 1). With the clinical diagnosis of pulmonary thromboembolism, a lower extremities Doppler ultrasound was done, finding clots in the deep venous system. EKG showed dilation and hypokinesia of right cavities, paradoxical movement of the

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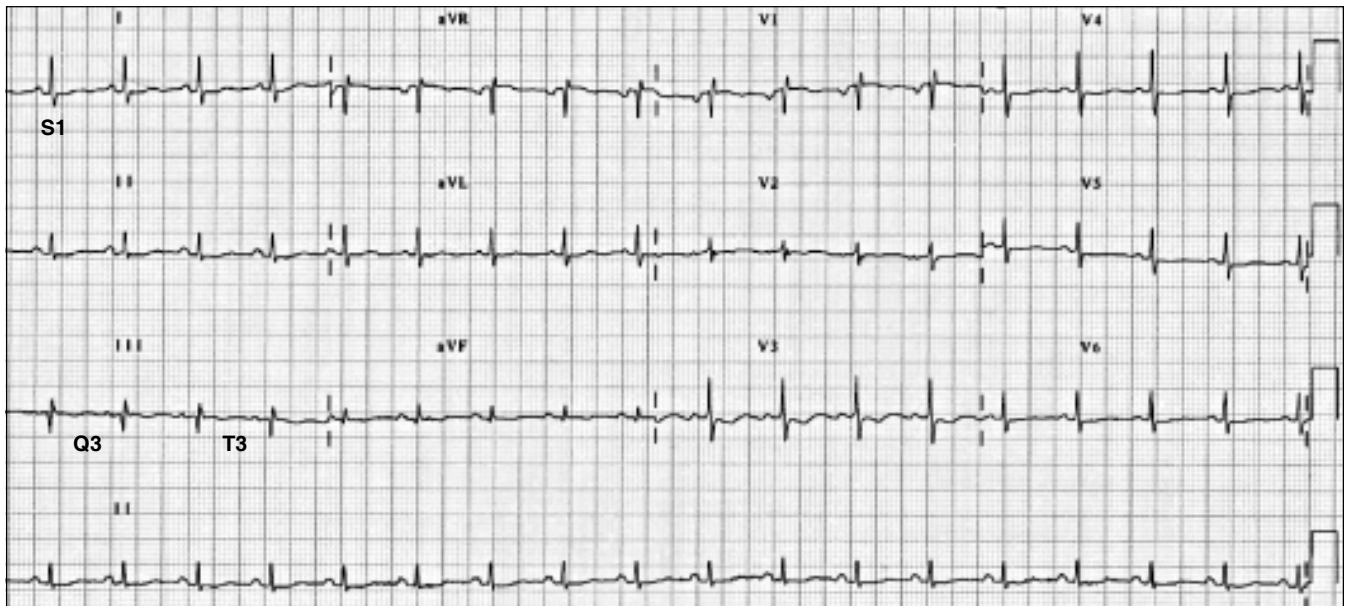


Figure 1. EKG where McGinn and White image characterized by the S1/Q3/T3 pattern.

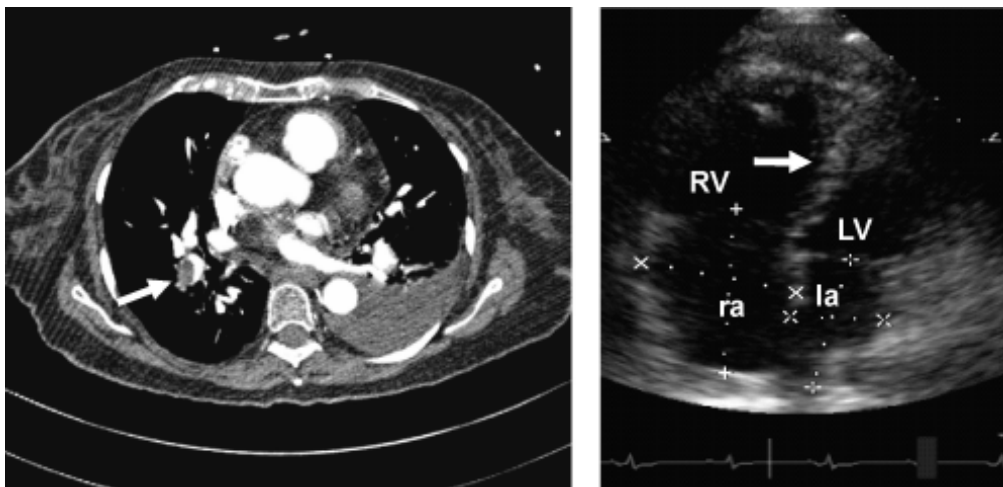


Figure 2. A. Thoracic computerized angio-tomography where the abnormal filling of a branch of the right pulmonary artery can be observed (arrow). **B.** Echocardiogram where dilation of the right ventricle with displacement of the interventricular septum to the left can be observed (arrow). RV: right ventricle. LV: left ventricle. ra: right atrial. la: left atrial.

interventricular septum and pulmonary hypertension with systolic pulmonary pressure of 100 mmHg. Thoracic heli-coidal computerized angio-tomography showed abnormal filling of a branch of the right pulmonary artery (Figure 2). The patient was treated with 100 mg of alteplase and levosimendan showing significant improvement.

DISCUSSION

The most frequent electrocardiographic manifestation, although in specific in pulmonary embolism, is the sinus tachycardia, with a 58% sensitivity and a 68% specificity.

Other alterations that can be observed are auricular flutter and fibrillation, supra and ventricular extrasystoles, complete or incomplete blockage of the right branch, delay in the right interventricular conduction, elevation or depression of the ST segment, inversion of T waves principally in right cavities, QT elongation and pulseless electric activity^{3,4} (Table 1).

Surawicz, *et al.* reports that the electrocardiogram helps in the diagnosis of the 69% of the cases when there's clinical risk of pulmonary embolism, in spite of that, the diagnosis of pulmonary embolism was confirmed only in the 8% of the patients suspected to suffer

Table 1. Electrocardiographic patterns in pulmonary embolism.

Rhythm
Sinusal tachycardia
Premature auricular complexes
Auricular flutter
Auricular fibrillation
Ventricular fibrillation
Pulseless electric activity
Sinusal bradycardia
P waves
Height > 2.5 mm D II, III o aVF
QRS complexes
Deviation of the axis to the right
Delay of the ventricular conduction
Right ventricle hypertrophy
Pseudo-stroke
Anterior
Posterior
Both
Deviation of the axis to the left (uncommon)
ST segment
Elevation
Depression
QT and QT waves
Inversion
QT elongation

pulmonary embolism using exclusively electrocardiographic changes.⁵

Punukollu, *et al.* corroborated that the electrocardiographic alterations presented in the pulmonary embolism are related with the dilation and dysfunction of the right ventricle, and with the ischemia generated by the increment of the intraventricular pressure. According to his results, the inversion of T waves between V1 and V3 have a 68% sensitivity and a 88% specificity, 84% PPV and a 73%

NPV to identify right ventricular insufficiency, while the McGinn and White pattern has a 27% sensitivity, 95% specificity, 85% PPV and 57% NPV finally the right bundle branch blockage a 23% sensitivity, 88% specificity, 64% PPV and 54% NPV.⁶

Acute pulmonary embolism is a common and fatal disease, which leads to consider a prompt diagnosis and treatment in order to prevent mortality, and even more if variations in the clinical picture difficult diagnosis. Recognize ECG findings could lead physicians to consider acute pulmonary embolism and promote early diagnosis.

ABBREVIATIONS

- **EKG:** electrocardiogram.
- **NPV:** negative predictive value.
- **PE:** pulmonary embolism.
- **PPV:** positive predictive value.
- **RBBB:** right bundle branch block.

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