Global T waves inversion and QT prolongation. An uncommon presentation of acute pulmonary embolism

Simone Savastano,1 Martina Querio,2 Ernesto Anesi,3 Rita Camporotondo4

1Division of Cardiology, Fondazione IRCCS Policlinico San Matteo, Pavia; 2School of Cardiovascular Disease, University of Pavia; 3Emergency Department, Fondazione IRCCS Policlinico San Matteo, Pavia; 4Intensive Coronary Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy

Abstract

This is the case of a man presenting to the emergency department for dyspnea. Despite a very common symptom he presented an uncommon twelve leads electrocardiogram (ECG). At a first glance it could have suggested an acute coronary syndrome, a Takotsubo cardiomyopathy or a hypertrophic cardiomyopathy. However the further investigations showed an acute pulmonary embolism (APE) whose pre-test probability was low with a Wells score of 0 and a Geneva simplified score of 1. Negative T waves have been described in APE, however, such a morphology associated with QT prolongation is a very rare presentation. This case confirms how the diagnosis of APE could be often insidious representing a challenge for the emergency physician.

Case Report

This is the case of a 82-year-old male who presented to the emergency department of our Hospital after four days of exertional dyspnea. He used to lead an active life until the onset of symptoms. Dyspnea appeared suddenly with a constant progression to the onset of symptoms. A more recent paper3 sought for differences among T waves morphology occurring in acute coronary syndromes, Takotsubo cardiomyopathy and in APE. In APE T waves usually remain positive in I, aVL (as in our case) and only in few cases T waves may be negative in V5, V6 and II. The same paper the maximal T wave negativity was also compared and it was shown that in APE T waves were less negative than in the other two conditions with a maximal negativity of 3.4 mm.

The underlying mechanism of T waves inversion in APE is not completely known and some theories have been proposed. The first and the most accredited is the coronary insufficiency due to the decreased perfusion of the right ventricle caused by the increase of ventricular pressures and by the increase of afterload. Another possible explanation may be the effect of an increased release of catecholamine due to hypoxia and hypotension. The most recent theory lies on the potential effect of histamine release. The suffering lung tissue may release histamine which can induce myocardial ischemia and coronary vasoospasm. From our perspective it appears quite difficult to find out a single mechanism which can justify the ECG pattern. The most likely hypothesis is a combination of the various mechanisms described above. In particular the prolongation of the QT interval suggest an underlying ischemia. Of course a previous ECG could have been interesting but it was not available.

Conclusions

In conclusion the current ECG with its atypical elements provides the occasion to meditate on the diagnosis of APE which is...
very often difficult and insidious representing a challenge for the emergency physician.

References

Case Report

Figure 1. ECG at admission showing regular sinus rhythm, normal atrio-ventricular conduction and giant, global symmetrical T waves inversion and QT prolongation.

Figure 2. Chest CT scan images outlining a subocclusive thrombosis of the right pulmonary artery and of the superior branch of the left pulmonary artery.