Mr. B is an 84 year-old African-American male veteran with a history of type 2 diabetes and hypertension who was admitted to the VA hospital for hypertensive urgency. In the ICU, he became unresponsive and pulseless. Tdimer showed “ventricular fibrillation” which spontaneously converted to sinus rhythm. An echocardiogram showed an ejection fraction of 60%. An ECG performed prior to the ventricular arrhythmia is shown below.

The major findings of this ECG are bradycardia, QT prolongation, U waves, and T wave alternans (TWA) best seen in leads V3, V4, and V5. With these findings, it is important to ask if the patient was really in ventricular fibrillation.

Ventricular fibrillation rarely spontaneously remits. The findings of QT prolongation and TWA prior to the event are suggestive of a ventricular tachyarrhythmia. This patient had normal electrolytes and was on no drugs that typically cause QT prolongation. He was sent to a hospital with an electrophysiology department and given the diagnosis of long QT syndrome and TWA. Mr. B’s risk of developing another tachyarrhythmia was considered very high therefore an Automatic Implantable Cardioverter Defibrillator (AICD) was placed.

TWA is a variation in the shape of the T waveform seen every other beat representing a change in the intrinsic repolarization of the heart. It is a highly sensitive and specific marker of susceptibility to ventricular arrhythmias and sudden cardiac death. TWA often precedes conditions like Prinzmetal’s angina, acute myocardial infarction, electrolyte imbalances and long QT syndrome. TWA is detected by measurement of microvolt level. TWA on surface Laplacian ECG is commonly associated with long QT syndrome. TWA seen by the naked eye on ECG is a rare finding. Testing for TWA may identify patients at increased risk who fulfill MADIT II criteria for AICD placement.

Thank you to Dr. Reddy for this interesting ECG.

References