Interesting Electrocardiogram: The Etiology of Diffusely Low T Waves—Revisited

M. Irené Ferrer, MD

The electrocardiogram shown here has as its one abnormality low voltage of T waves in every one of the 12 classical electrocardiographic leads. None of these low T waves is negative in direction however, and there is no ST abnormality.

The finding of diffusely low T waves in an electrocardiogram is common but the interpretation is often difficult unless clinical information is available. Hence, the electrocardiographic term ‘‘non-specific T wave abnormalities’’ is often seen in ECG interpretations. One could make a very long list of conditions, which account for the finding of low T waves, but perhaps it should first be stressed that if there is no ST deviation and no negative T waves, a large number of cardiac diagnoses can be ruled out. Low serum, and therefore presumably low myocardial potassium, is a very frequent cause. If prominent U waves ac-
company the low T waves, the diagnosis of this electrolyte imbalance is clear. There are some more benign causes for low T waves, such as for example, chilling of the myocardium by swallowing of a cold drink (cooling the esophagus which lies over the cardiac musculature) taken just before the ECG is recorded. The ingestion of a meal will also lower T waves, probably by producing a transitory potassium flux out of the serum. Hyperventilation, anxiety and moderate sinus tachycardia can also induce T wave lowering operating through the catecholamine systems.

The effect of gastrointestinal diseases upon the electrocardiogram is another area of interest in the T wave analysis. In the tracing shown here, the patient was a 66-year-old male hospitalized because of acute pancreatitis. The vomiting accompanying this illness could account for hypokalemia and hence low T waves that are particularly evident in the limb leads. Another, and unusual, possibility is retroperitoneal inflammatory reaction with possible abscess formation from the pancreatitis which spreads above the diaphragm to cause infectious pericarditis. There is no ST elevation in this ECG, but acute phase of pericarditis may have passed. Serial ECGs would make the diagnosis of pericarditis if T waves became negative later on. Electrolyte imbalance due to vomiting or diarrhea is often seen on the ECGs of these patients. Sinus tachycardia in such acutely ill individuals may also contribute to low T waves. The development of negative T waves in diaphragmatic leads (II, III, aVF) was at one time accepted as part of the ECG findings in acute gall bladder episodes. This is now recognized as incorrect and if negative T waves exist in such patients, an explanation other than the GI disease is needed.

In summary, diffusely low T waves are often benign but require some considerable analysis. In insurance medicine, it is often decided to request an exercise test to rule out coronary disease as the etiology. It should be said however, that coronary disease is seldom the cause of diffusely low T waves.

Editors note: From the personal papers of Dr. Irene Ferrer, published here with the permission of her daughter, Dr. Marianne Legato. This piece was written in 1982.