

Case Report

U wave: an Important Noninvasive Electrocardiographic Diagnostic Marker

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Abstract

Study of U waves exemplifies important clinical role of noninvasive electrocardiography in modern cardiology. Present article highlights significance of U waves with a clinical case and also summarizes in brief the history of the same.

Keywords: Electrocardiogram, U wave

Study of U waves has been more of academic importance rather than clinical application. Negative U waves when present may be of immense clinical importance. We describe here one such case where U waves were not only an early noninvasive marker for acute ischemia but they also disappeared after successful revascularization.

The U wave, named by Einthoven in 1903, is still a subject of debate with respect to its origin and clinical importance¹. Three hypotheses addressing the genesis of U wave that have been put forth include late repolarization of Purkinje fibers, late repolarization of some other portions of left ventricle, and alteration in the normal action potential shape by after-potentials². U waves have same polarity as T waves in normal subjects. Any alteration in the same with respect to T wave is of importance. A 50 year old male, chronic smoker, non hypertensive and non diabetic presented with unstable angina (Braunwald class IIIb2). Electrocardiogram showed normal sinus rhythm with upright T waves and no ST-T changes, but prominent inverted U waves in mid precordial leads (**Fig. 1a**). Echocardiography showed normal LV systolic and diastolic function. Coronary angiogram revealed a discrete tight stenosis (90%) in the mid left anterior descending artery (**Fig. 2a**). Coronary angioplasty with stenting was successfully carried out (**Fig. 2b**). Immediate post procedure ECG revealed remarkable disappearance of U waves (**Fig. 1b**).

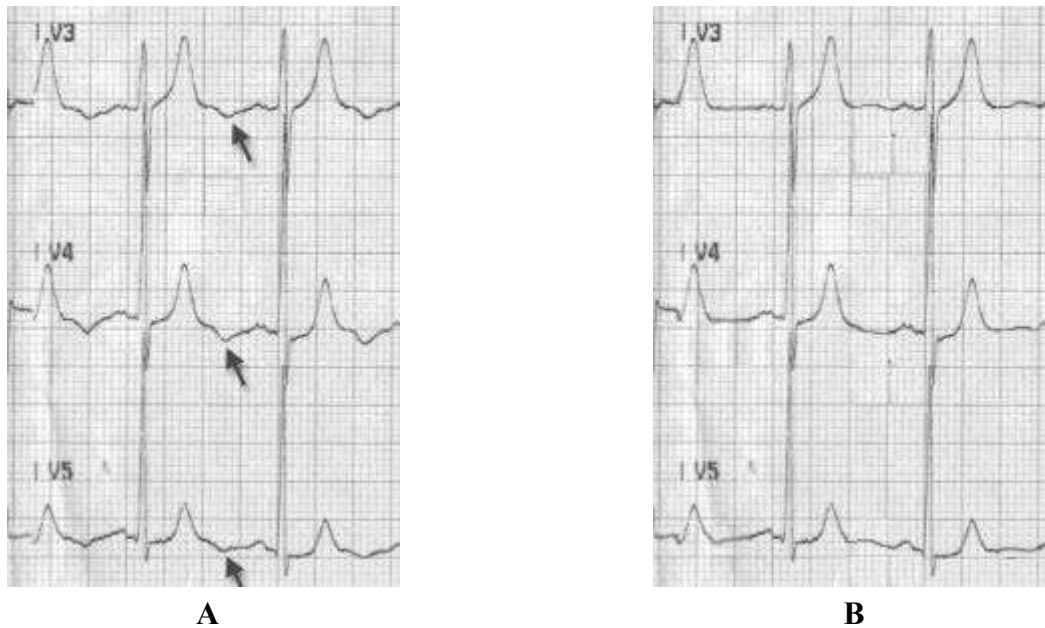


Figure 1: **A** Electrocardiogram showing prominent 'U' waves (arrows) in leads V3, V4, V5 in patient prior to intervention. **B** Post revascularization electrocardiogram showing dramatic disappearance of U waves with similar other findings.

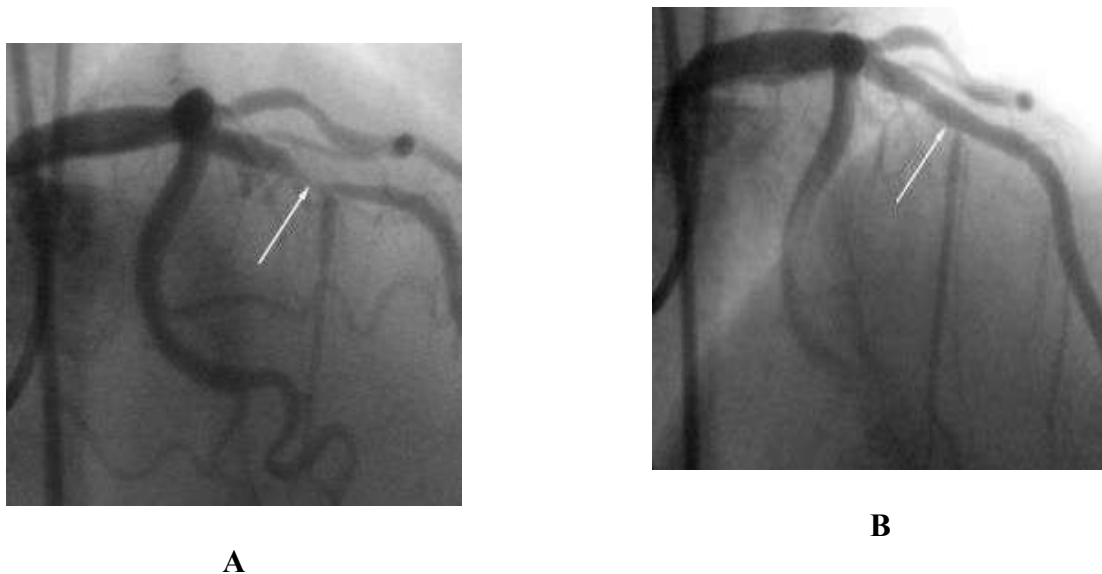


Figure 2: **A** Angiogram in Right anterior oblique cranial view showing tight stenosis in left anterior descending artery **B** Post revascularization angiogram in Right anterior oblique cranial view showing TIMI 3 flow in left anterior descending artery.

Negative U waves have low sensitivity but high specificity for heart disease and they are recorded in approximately 1% of all electrocardiograms in general hospital³. Negative U waves at rest, may be the earliest marker of unstable angina and evolving myocardial infarction³. They may also be seen at rest in cases of hypertension, variant angina, congenital long QT syndromes, left ventricular enlargement, left anterior descending coronary artery disease and valvular heart disease (aortic and mitral valve disease)^{3,4}. Others however showed that negative U waves during acute anterior wall myocardial infarction are useful in identifying patients with smaller infarction

and better collateral circulation but they had no predictive value in localizing the diseased artery⁵. U waves on exercise may be seen in cases of significant left circumflex or right coronary artery disease with abundant collaterals⁶.

The present case exemplifies the significance of negative U waves as the important sign of acute ischemia. We believe that clinical utility of U waves remains underutilized and more clinical studies are needed to exactly define their significance in the spectrum of coronary artery disease.

References

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