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Journal of Biomedical Research & Environmental Sciences main aim is to enhance the importance of science and technology to the scientific community and also to provide an equal opportunity to seek and share ideas to all our researchers and scientists without any barriers to develop their career and helping in their development of discovering the world.

CLINICAL IMAGE

# Reflection on the benignity or pathology of the presence of “U waves” in the electrocardiogram

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We present the electrocardiogram (Figure 1) of a 14-year-old man in which, without related pathology, and incidentally in the context of a consultation for another reason, a U wave was detected in precordial leads V3 and V4. Does that U wave have pathological significance?

## DISCUSSION

We know from the U wave of the electrocardiogram (ECG) the positive wave in precordial leads (negative in aVR), of low amplitude and low frequency, located in the TP segment just after the T wave [1]. It is not always noticeable, and it is easier to see in patients with a heart rate prone to bradycardia (it is rarely perceived with heart rates above 95 beats per minute) [2,3].

It can be a physiological finding (secondary to a slow repolarization of the Purkinje fibers, a repolarization of the papillary muscles, or postpotentials caused by stretching of the left ventricular wall during diastole), or appear in pathological contexts [1-6].

Positive in cases of: hypercalcemia, hypokalaemia (visualized even in mild hypokalaemia: K + around 3.5 milliequivalents / liter), thyrotoxicosis, or in patients treated with digitalis, quinidine, amiodarone or phenothiazines.

Negative in cases of: arterial hypertension, mitral or aortic valve disease, right ventricular hypertrophy, or ischemic heart disease (in a patient with acute chest pain, a negative U wave in the precordial leads or inferior leads represents an ischemic injury until prove otherwise [5]; and exercise-induced inversion of the U wave is also highly predictive of significant coronary artery disease) [6].

The only way to suspect if a U wave is pathological will be through the symptoms and history of the patient, and the chronic treatment of him.

Therefore, we must rule out with complementary studies that a U wave represents a pathological situation when:

- Its width is > 2 millimeters (more visible in V2-4).
- It is inverted in precordial leads (Figure 2) [4].

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Hosp. BIDASOA  
URGENCIAS

FC 77 . Edad no introducida, se consideran 50 años a efectos de interpretación del ECG  
PR 111 . Ritmo sinusal.....eje P normal, frec-V 50-99  
QRSD 106 . Intervalo PR corto en el límite.....intervalo PR < 120ms  
QT 406 . RSR' en V1 o V2, retraso conducción VD o HVD.....QRS positivo y R' en V1/V2  
QTc 460 . Elevación de ST sugiere pericarditis aguda.....ST>0.10mV, en ant/lat/inf

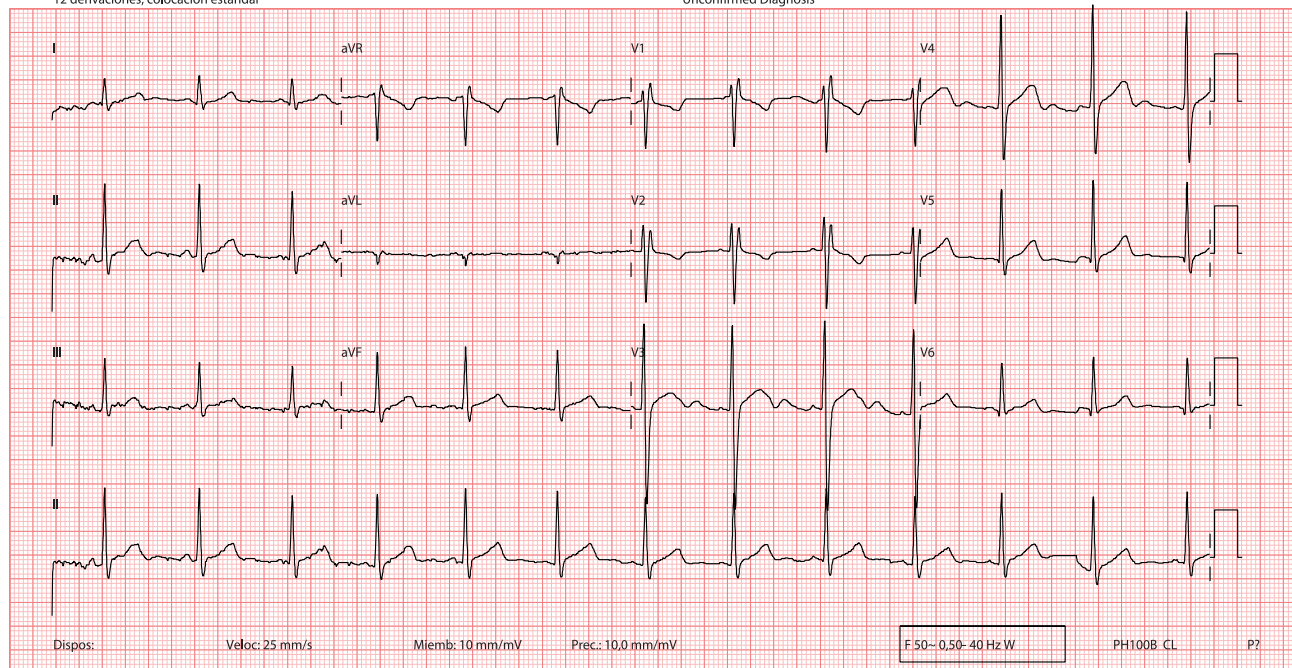
-EJES-

P 14  
QRS 71  
T 59

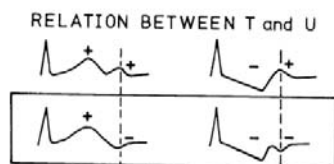
- ECG ANOMALO -

12 derivaciones; colocación estándar

Unconfirmed Diagnosis



**Figure 1** Sinus rhythm at 76 bpm with PR 0.1, incomplete right bundle branch block and positive U wave in V3-4.



**Figure 2** Partial and full U wave inversion patterns associated with positive T wave (left panel) and negative T wave (right panel). U waves from top to bottom: positive (+), negative (-) [4].

- It merges with the T wave (more common if it coexists with a markedly long QT. Not to be confused with cases in which it appears together with tachycardia: in these, the U wave appears before the end of the T wave and gives an image of T "nicked" with false prolongation of the QT space).
- Its amplitude is greater than that of the previous T wave.
- Happens in elderly patients.

Although the U wave remains a mystery as to its genesis, the clinical observation of this small "neglected" wave can have great clinical significance in very different pathologies.

Taking this information into account can be especially useful in care settings where other complementary tests are not available, such as Primary Care consultations or Continuous Care Points.

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