ECG Underwriting Puzzler

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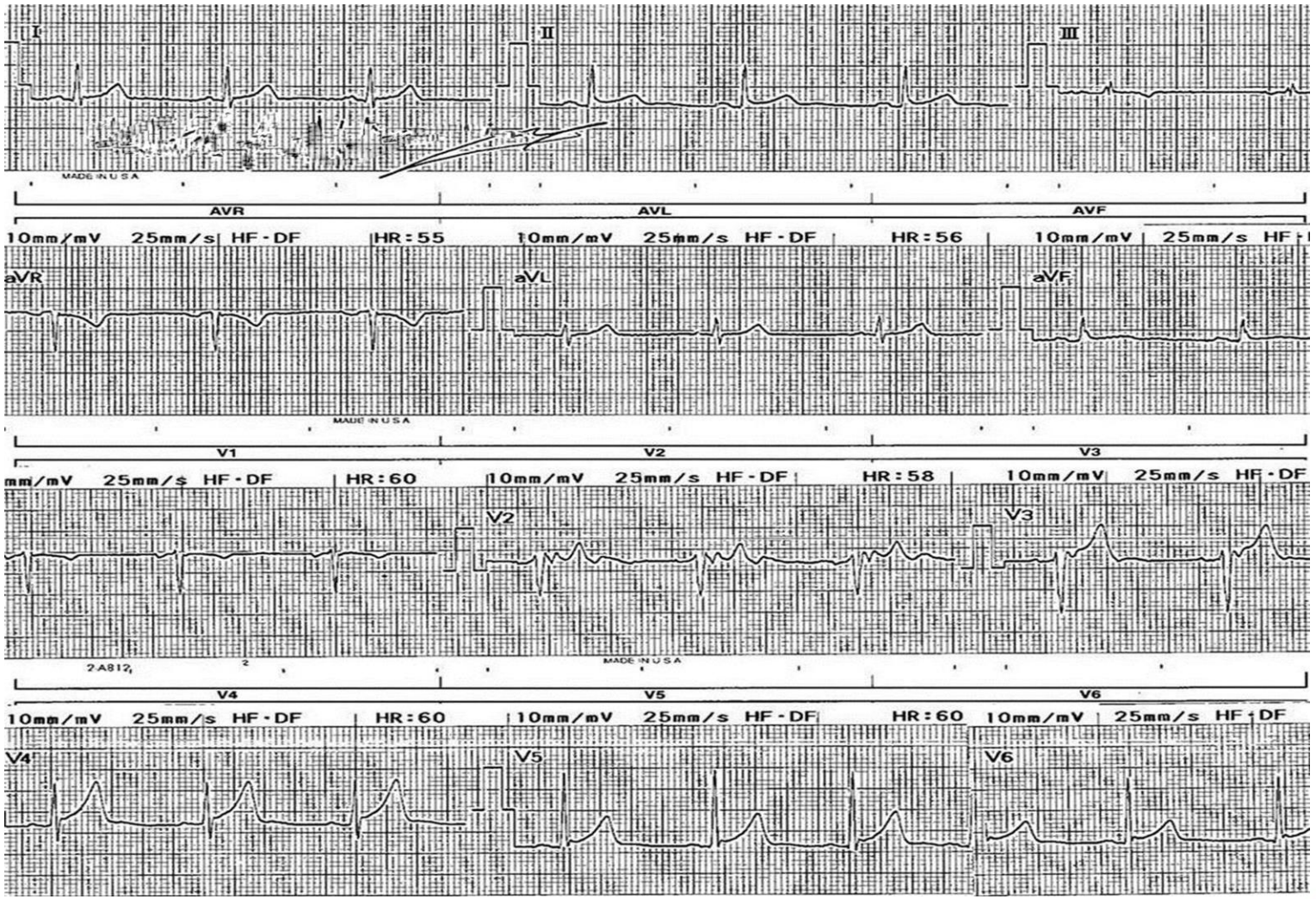
Puzzler

A 31 year-old male applied for life insurance with history of syncope in two occasions labelled by his Primary Care Physician as “vasovagal”.
He had no cardiovascular risk factors and no family history of sudden death.
His physical, BMI and vitals are within normal limits.
His labs including serum calcium are WNL.
No further work up was performed.

Is this EKG totally normal ?



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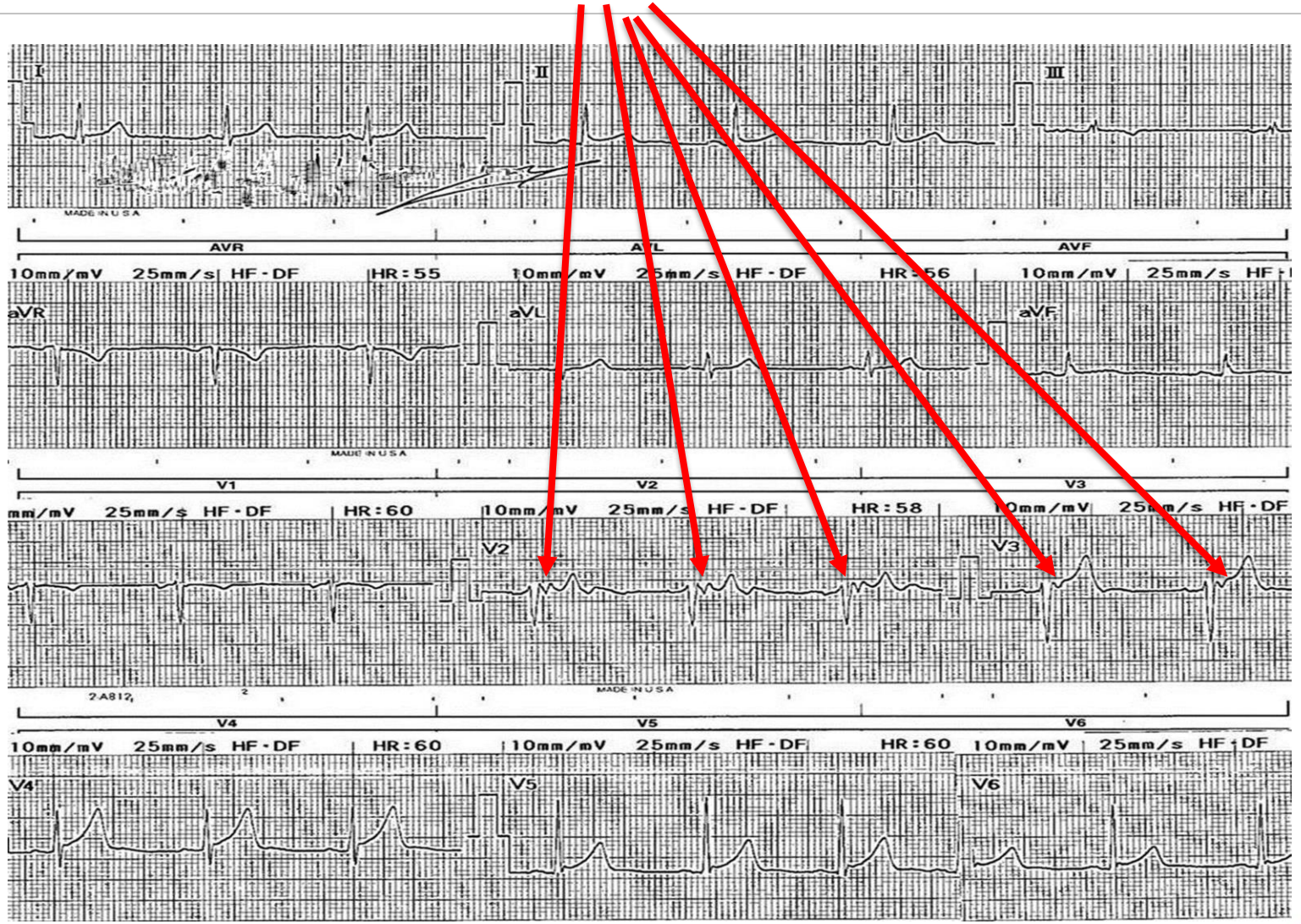
What are these squiggles?



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Criteria for Epsilon waves

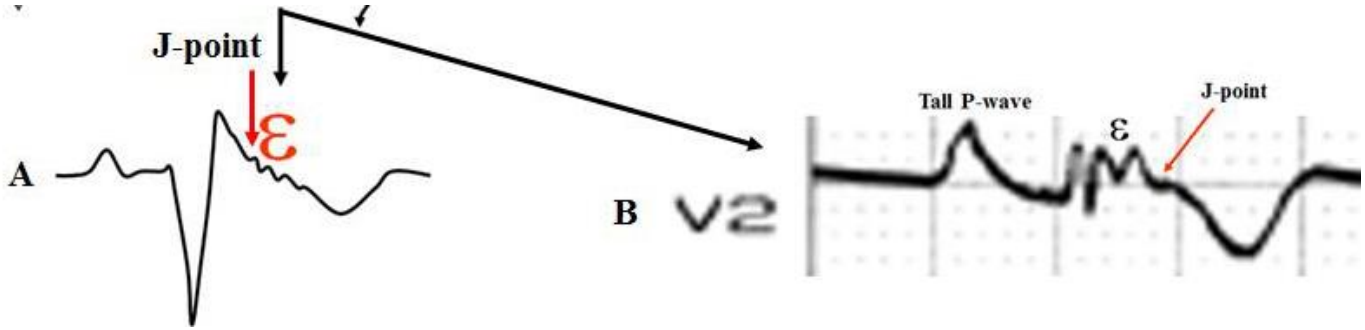
It is a late depolarization of right ventricular fibers of right ventricular free wall registered mainly in V1-V4 leads, these oscillations are best seen in the ST segments of leads V1 and V2, different from J wave seen in V5, V6 and inferior leads.

1.Classical concept: The Epsilon wave was defined as wiggler, small spike wave and smooth potential located between the end of the QRS complex (J point) and the beginning of the ST segment:

1. Small spike waves: The most common type. They are divided into 2 subtypes, upward and downward.
2. Wiggle waves
3. Smooth potential waves

Criteria for Epsilon waves

2. **New concept:** in many cases the definition of epsilon waves/ epsilon potentials remains difficult because some authors consider that these waves may be inside of the QRS complex, manifested as QRS fragmentation (fQRS) or QRS notching



A. Oscillations registered after J-point at the beginning of ST segment.
B. Oscillations registered inside the QRS complex. In this case, epsilon waves are indistinguishable of fQRS.

What conditions can give epsilon waves?

- Arrhythmogenic Right Ventricular Cardiomyopathy
- Senior endurance athlete heart
- Ischemic and non ischemic cardiomyopathies
- After radiotherapy for breast cancer
- Giant cell myocarditis
- Sickle cell anemia
- Brugada syndrome
- After repair Fallot Tetralogy
- Right ventricular myocardial infarction
- Cardiac sarcoidosis

What is abnormal about this ECG?

1-Is it an epsilon wave in V2 and V3 due to an ARVC (Arrhythmogenic Right Ventricular Cardiomyopathy) or an artifact ?

Against ARVC :

. T waves are not inverted in right precordial chest leads

. There is no prolonged S waves upstroke in V1 through V3

. QRS duration < 110 msec in V1 through V3

. No PVCs

. No family history of sudden cardiac deaths.

2- There is a J point elevation > 0.10 mV, with an end QRS notch in inferior and lateral leads and an ascending ST segment.

Conclusion

This is most likely a case of Early Repolarization Pattern.

Knowing that some dynamic changes in J point elevation can occur with accentuation of the pattern during arrhythmias and the Relative Risk of Sudden Cardiac Death equals 3 when the J point elevation is > 0.2 mV, it would be prudent in this case of a young male, with 2 unexplained syncopes to require a complete cardiac evaluation to consider.