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Novel epsilon wave characteristics in arrhythmogenic cardiomyopathy

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Purpose

Earlier studies describe substrate of arrhythmogenic cardiomyopathy (ACM) consisting high degree of heterogeneity. The epsilon wave has been described in ACM patients. Its onset to the R wave onset was characterized including wave duration, presence in the inferior leads and amplitude beyond lead V1 in an ACM population.

Methods

Eighty five consecutive patients fulfilling the 2010 Task Force diagnostic criteria were recruited from a multicentre ACM cohort. Seventy one of them were patients of Desmin-related progeria. All subjects were carefully analysed with standard 12-lead ECG and low-resolution echocardiography. Epsilon waves were evaluated in all precordial and inferior leads. Novel parameters including their duration and penetration into the ST segment were assessed. Epsilon waves were defined as reproducible low amplitude signals after the end of QRS complex up to the onset of T waves. They were studied in all precordial and inferior leads. Epsilon wave duration was defined as the interval between the low amplitude signals onset and offset. The highest measured value in precordial leads was recorded for each patient (Figure 1).

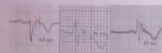


Figure 1. Measurements of epsilon wave duration in inferior V1 lead ECG recording 12 leads. (Reproducible in all patients). Short vertical lines are the onset and offset of the epsilon wave. The epsilon wave measured duration is shown in each lead.

Results

Seventy five subjects (93%) exhibited epsilon waves. In 57 patients they were observed in lead V1 and lateral leads V5-V6. Epsilon waves were observed with high degree of heterogeneity in the right precordial leads from V1 to V4. The epsilon wave duration was significantly longer in the right precordial leads (V1-V4) compared to the left precordial leads (V5-V6) (p < 0.001). Patients with epsilon waves exhibited increased BNP levels (p < 0.001).

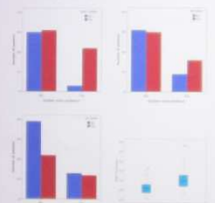


Figure 2. Bar chart showing the prevalence of epsilon waves in different leads. The x-axis shows the leads (V1-V6) and the y-axis shows the number of patients. The epsilon wave was observed in all precordial leads.

Correlates with duration of epsilon waves (Figure 3) showed a significant negative correlation between epsilon wave duration and age (p < 0.001).

Figure 3. Scatter plot showing the correlation of epsilon wave duration with age. The x-axis is Age (years) and the y-axis is Epsilon wave duration (ms). The plot shows a negative correlation between age and epsilon wave duration.



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Conclusions

Earlier studies using vector loops and precordial and inferior leads have described the epsilon wave and its penetration into the ST segment. Epsilon waves have been associated with ACM. The epsilon wave duration was significantly longer in the right precordial leads compared to the left precordial leads. Epsilon wave duration was significantly longer in the right precordial leads compared to the left precordial leads.

Declaration of interest

Professor McKenna received a grant from the Department of Health, London, United Kingdom. The funding was used for support of this work.

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