Electrocardiogram Screening in Athletes

Electrocardiogram Screening in Athletes: Athletes who collapse secondary to cardiac causes: typically do so suddenly, may demonstrate seizure activity secondary to ventricular tachycardia, and may have shockable rhythms (either ventricular tachycardia or ventricular fibrillation) when an AED is attached.

1) Brugada

2) Hypertrophic obstructive cardiomyopathy (HOCM)

3) Prolonged QT syndrome

4) Wolf Parkinson White

5) ARVD

6) Short QT Syndrome

ECG findings in keeping with potential Sudden Cardiac Death:

1. Brugada Syndrome – It is due to a genetic mutation of cardiac sodium channel. ECG: ST elevation > 2mm in V1-3 followed by a negative t-wave .... If found an athlete may require an implantable cardioverter defibrillator (ICD).

Figure 1 – ST elevation in V1 and V1 with downslope (www.ecgpedia.org)

！Figure 2 – Close-up of downsloping ST elevation in V1
2. Hypertrophic obstructive cardiomyopathy (HOCM) – Hypertrophy of the cardiac myocardium potentially causing obstruction of outflow (N.B. association with WPW)

ECG:

. a) Voltage criteria for left ventricular hypertrophy

. b) Deep narrow “dagger-like” Q waves in I, aVL, V5,6 and/or II, III, aVF

. c) Other (Axis deviation, atrial enlargement, ST-T wave abnormalities)
3. Prolonged QT – Long QT syndrome or could be secondary to medications (TCAs, SSRI’s, antibiotics). ECG: a simple way of estimating whether prolonged QT is long is comparing the QT to the RR interval. If QT is more than half the distance of RR – you have a prolonged QT.

Figure 5- Prolonged QT syndrome close up of lead II
4. Wolff-Parkinson White (WPW) - It is an accessory pathway that allows preexcitation. ECG: Delta wave – Delta waves are seen as a slow sloped beginning to an R wave. WPW is also associated with a shortened PR interval (<120).

Figure 7- Delta wave (www.ecgpedia.org):

Figure 8 – shortened PR wave and delta waves
5. Arrhythmogenic Right Ventricular Dysplasia (ARVD) – also known as arrhythmogenic right ventricular cardiomyopathy. It can lead to PVC’s and Ventricular tachycardia.
Figure 9 - ECG: Epsilon wave – wave occurs after QRS complex, and is a sign of ARVD

Figure 10 - epsilon waves after QRS interval:
6. Short QT syndrome – Characterized by a shortened QT length. Although there is no consensus on a single QT interval for diagnosis, a QTc of <330 ms should be diagnostic for males and a QTc of < 340 ms in females. It can lead to atrial fibrillation, ventricular tachycardia, ventricular fibrillation and sudden cardiac death.

Figure 11 ECG with short qt syndrome.: 

References:

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