

HIGH RESOLUTION ECG (SIGNAL AVERAGED ECG)

It is used to identify slow propagation of myocardial conduction that is not evident on a surface ECG.

Slow propagation is associated with being a substrate for arrhythmias such as ventricular tachycardia (VT).

Conduction abnormalities are shown as “late potentials” on the signal averaged ECG. They occur at the terminal portion of the QRS complex.

PROPERTIES OF POTENTIALS:

- LATE: they occur at the latter part of depolarisation (therefore occur at the terminal portion of the QRS complex). This is because scar tissue depolarises more slowly.
- LOW AMPLITUDE: abnormal propagation through areas of slow conduction means low amplitude signals occur due to the small amount of tissue being propagated.
- HIGH FREQUENCY

USES:

- Risk stratification of ventricular arrhythmias post MI
- Cardiomyopathy detection – specifically Arrhythmogenic right ventricular cardiomyopathy (ARVC)
- Syncope – see if there is an underlying cause
- Assessment of surgery success to treat an arrhythmia
- Detection of acute rejection of heart transplant
- Assessment of anti-arrhythmic medication
- Risk stratification for Brugada patients (see below)
- Assessment of pharmacological/surgical success for restoring blood flow to a coronary artery

BRUGADA

Brugada is an inherited channelopathy affecting the sodium channels in the heart.

On a surface ECG it can look like right bundle branch block (RBBB) with J point elevation/ ST elevation typically occurring in leads V1-V3.

QRS complexes on a surface ECG are the summation of total electrical activity. This is the addition of every extra cellular action potential that leads to ventricular depolarisation. This can mask late, low amplitude and high frequency potentials. These are clinically significant as they represent slow conduction.

Signal averaged ECG reduces random noise by averaging 250-500 QRS complexes. Ideally the noise is reduced to 0.3 uv. This enhances the detection of low amplitude signals by amplifying the terminal portion of the QRS complex.