

Ventricular Arrhythmias and Sudden Cardiac Arrest

Christian Anderson, February 22, 2022

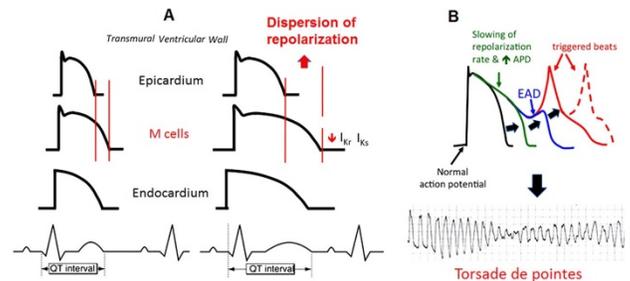
Definition: Ventricular arrhythmias exist on a spectrum of severity from premature ventricular complexes to ventricular tachycardia/fibrillation storm.

1. They originate from the ventricle and sustained if lasting >30 seconds
2. Torsades de Pointes is polymorphic ventricular tachycardia due to an acquired long QT interval. This is the only situation where magnesium effectively treats ventricular tachycardias.

Epidemiology: Ventricular arrhythmias and sudden cardiac death are the initial presentation of cardiac disease in ~180,000 people each year

Pathophysiology: There are three mechanisms leading to ventricular arrhythmias:

1. Enhanced automaticity: Persistent ischemia leads to an increase in the resting membrane potential resulting in increased autonomous depolarization of the myocardium
2. Triggered activity: Prolongation of the myocyte action potential increases the frequency of early afterdepolarizations resulting in aberrant ventricular conduction. Most frequently seen with medication or congenital long-QT syndromes
3. Re-entry: Focal areas of reduced conduction facilitate the development of re-entrant pathways leading to depolarization loops. Frequently observed post-infarction



Etiology: Roughly 70% of ventricular arrhythmias and sudden cardiac arrest/death are related to ischemia, with the remaining 30% split roughly evenly between structural heart disease, disorders of cardiac myocyte conduction (QT abnormalities), and non-cardiac causes.

Evaluation: Patients with suspected ventricular arrhythmias are evaluated in the Internal Medicine setting as follows:

1. 12 lead ECG/ Holter monitor/30-day event monitor/Transthoracic echocardiogram
2. Medication review/Family history of cardiac events
3. Lab/electrolyte assessment

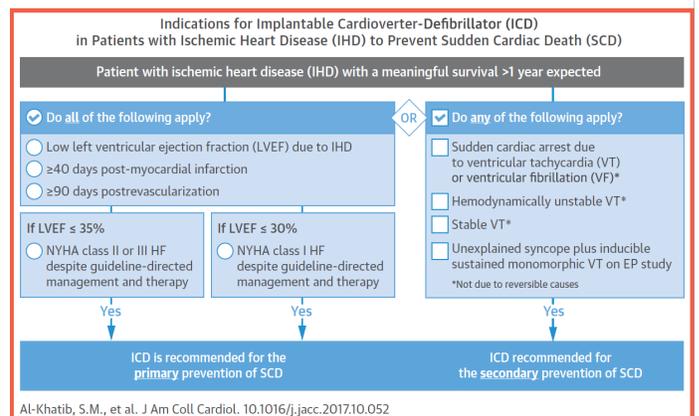
Treatment: Medications for ventricular arrhythmias have limited mortality benefits, with beta blockers possessing the largest impact on mortality

1. Beta blockers provide effective treatment of ventricular arrhythmias in ischemia, heart failure with reduced ejection fraction, and some inherited channelopathies
2. Guideline directed medical therapy for heart failure with reduced ejection fraction effectively reduces the risk of ventricular arrhythmias and sudden cardiac death

Implantable Cardioverter-Defibrillators: ICDs are definitive treatment for ventricular arrhythmias, and are placed for primary or secondary prevention

1. Secondary prevention: patients with a prior ventricular arrhythmia not due to a reversible cause
 1. Reversible causes: electrolyte abnormalities, ischemia, and medication induced arrhythmias
2. Primary prevention: patients who are at risk, but have not yet had a ventricular arrhythmia

1. Currently the strongest indication for primary prevention is patients with an left ventricle ejection fraction less than 35% after medical optimization
2. May be indicated for certain patients with inherited channelopathies or selected cardiomyopathies



References

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