Sudden Cardiac Death (SCD) frequently follows episodes of ventricular fibrillation (VF) or ventricular tachycardia (VT).

In patients successfully resuscitated following Sudden Cardiac Death, a major goal of risk-stratification and therapy is to reduce mortality and prevent recurrent cardiac arrest.

Patients presenting with Sudden Cardiac Death in the context of “reversible” etiologies, such as acute myocardial infarction (MI), are frequently not treated with Implantable Cardioverter Defibrillators (ICDs) to prevent recurrent arrhythmia-associated SCD, in the absence of other risk factors for SCD.

**BACKGROUND**

- **Mortality in patients that have experienced Sudden Cardiac Death in the context of acute myocardial infarction may be higher than expected, frequently due to recurrent arrhythmia.**
- **There is insufficient data to determine whether the routine use of Implantable Cardioverter Defibrillators (ICDs) may decrease mortality in post-AMI related SCD patients with preserved systolic function.**
- **Additional investigation is needed to determine optimal methods of secondary prevention of arrhythmia and SCD in this population.**

**CASE**

- **A 49 year old male was found in VF arrest after collapsing in public. He was with LV dysfunction due to prior MI who are at least 40 days post MI.**
- **Although randomized trials like AVID have demonstrated that ICDs with NSVT due to prior MI, LVEF <40%, and inducible VF or sustained VT at treadmill test showed no acute ischemic changes or arrhythmia. LVEF was 55% and normal ventricular function.**
- **He experienced no persistent arrhythmias. A subsequent sub-maximal exercise treadmill test showed no acute ischemic changes or arrhythmia. LVEF was 55-60% on echocardiogram. He was discharged on standard medical therapy. As he did not meet guidelines for ICD therapy, none was placed.**
- **Within 48 hours of discharge, the patient was discovered in pulseless electrical activity (PEA) arrest. Following prolonged CPR, he underwent cardiac catheterization, which showed patent coronaries and an LVEF of 35-40%.**
- **Despite aggressive therapy, he became persistently hypotensive with evidence of severe neurologic dysfunction. Care was withdrawn, and the patient expired.**
- **Ventricular arrhythmia is the likely etiology of his second episode of SCD, although this cannot be documented with certainty.**

**TEACHING POINTS**

- Conservative management of patients with preserved systolic function who have been resuscitated after experiencing SCD secondary to myocardial infarction may rest on the assumption that subsequent mortality is low and/or that survival may not be enhanced by ICD therapy.
- No randomized clinical trials demonstrate the efficacy of revascularization in the prevention of recurrent SCD.
- Wyse et al. (2001) found that survival in patients with presumed transient etiologies of VF/VT was not superior to that of those with a history of arrhythmia associated with “irreversible” causes such as depressed LVEF. Those with presumed non-reversible cause of SCD were treated with ICDs and/or antiarrhythmic agents.
- Although randomized trials like AVID have demonstrated that ICDs confer a survival benefit in survivors of SCD with depressed LVEF, current guidelines do not recommend placement of an ICD when SCD is attributed to myocardial ischemia in patients with preserved LVEF.
- Randomized controlled trials evaluating the effects of ICDs on outcomes in revascularized survivors of SCD attributed to AMI with preserved LVEF have not yet been completed.
- ICDs, however, may not necessarily improve outcomes in such patients.
- Recent investigators have questioned the benefit of ICDs even in patients traditionally treated with these devices.
- Additionally, both the DINAMIT and recent IRIS study found no mortality benefit of ICDs in the early post-AMI period among patients with depressed systolic function, a group at high risk for SCD. This was despite a decrease in frequency of sudden cardiac (arrhythmic) death in patients implanted with an ICD.
- This case illustrates the risk of recurrent SCD in post-AMI patients with preserved systolic function and shows that further investigation into risk-stratification and secondary prevention is needed.

**RElevant Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities (2008 ACC/AHA/HRS)**

**ICD therapy is indicated** in patients (Class I recommendations)
- who are survivors of cardiac arrest due to ventricular fibrillation or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes
- with structural heart disease and spontaneous sustained VT, whether hemodynamically stable or unstable
- with LVEF < 35% due to prior MI who are at least 40 days post-MI and NYHA Class II or III
- with LV dysfunction due to prior MI who are at least 40 days post-MI, LVEF <30% and NYHA Functional Class I
- with NSVT due to prior MI, LVEF<40%, and inducible VF or sustained VT at EP study

**ICD implantation is reasonable** (Class Ib recommendation) for patients with sustained VT and normal or near-normal ventricular function

**ICD therapy is not indicated** (Class III recommendation) for patients with ventricular tachyarrhythmias due to a completely reversible disorder in the absence of structural heart disease, e.g. electrolyte imbalance, drugs, trauma

**REFERENCES**

- AVID Investigators. A comparison of antiarrhythmic-drug therapy with implanta

**DISCUSSION**

- **A 49 year old male was found in VF arrest after collapsing in public. He was found to have an acute anterior ST elevation myocardial infarction; he received a drug-eluting stent to the Left Anterior Descending Artery. Left ventricular ejection fraction (LVEF) was 55-60% on echocardiogram. He was discharged on standard medical therapy. As he did not meet guidelines for ICD therapy, none was placed.**
- **Within 48 hours of discharge, the patient was discovered in pulseless electrical activity (PEA) arrest. Following prolonged CPR, he underwent cardiac catheterization, which showed patent coronaries and an LVEF of 35-40%.**
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