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Editorial Open Access

Indications for Implantable Cardioverter-Defibrillator Therapy and Recommendations for Implantable Cardioverter-Defibrillator Therapy in Patients not Included or not Well Represented in Clinical Trials

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Editorial

The American College of Cardiology Foundation (ACCF)/ American Heart Association (AHA) guidelines recommend that Class I indications for therapy with an implantable cardioverter defibrillator (ICD) are 1) cardiac arrest due to ventricular fibrillation (VF) or ventricular tachycardia (VT) not due to a transient or a reversible cause; 2) spontaneous sustained VT; 3) syncope of undetermined origin with clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiologic study when drug therapy is ineffective, not tolerated, or not preferred; ; 4) patients with prior myocardial infarction (MI) at least 40 days previously with a left ventricular ejection fraction (LVEF) less than 35% who are in New York Heart Association (NYHA) class II or III; 5) patients with nonischemic dilated cardiomyopathy with a LVEF less than or equal to 35% who are in NYHA class II or III; 6) patients with prior MI at least 40 days previously with a LVEF less than 30% who are in NYHA class I; and 7) patients with nonsustained VT due to prior MI with a LVEF less than 40% and inducible VF or sustained VT at electrophysiological study [1].

The 2009 updated ACCF/AHA guidelines for treatment of heart failure recommend with a class I indication use of an ICD for 1) secondary prevention to increase survival in patients with current or prior symptoms of heart failure and decreased LVEF who have a history of cardiac arrest, VF, or hemodynamically destabilizing VT; 2) primary prevention of sudden cardiac death to reduce mortality in patients with nonischemic dilated cardiomyopathy or coronary artery disease at least 40 days after MI, a LVEF less than or equal to 35%, and NYHA class II or III symptoms on optimal medical therapy, with expectation of survival with good functional status for more than 1 year; and 3) may be used in patients receiving cardiac resynchronization therapy (CRT) for NYHA class III or ambulatory class IV symptoms despite recommended optimal medical therapy [2,3].

The ACC/AHA guidelines recommend that class IIa indications for treatment with an ICD are 1) unexplained syncope, significant LV dysfunction , and nonischemic dilated cardiomyopathy; 2) sustained VT and normal or near normal LV function; 3) hypertrophic cardiomyopathy with one or more major risk factors for sudden cardiac death (SCD); 4) prevention of SCD in patients with arrhythmogenic right ventricular dysplasia/cardiomyopathy who have one or more risk factors for SCD; 5) reduction of SCD in patients with long-QT syndrome who are having syncope and/or VT while using beta blockers; 6) nonhospitalized patients awaiting cardiac transplantation; 7) patients with Brugada syndrome who have had syncope; 8) patients with Brugada syndrome who have had documented VT that has not resulted in cardiac arrest,; 9) patients with catecholaminergic polymorphic VT who have syncope and/or documented sustained VT while using beta blockers; and 10) patients with cardiac sarcoidosis, giant cell myocarditis, or Chagas disease [1].

An ICD may also be effective in preventing SCD in patients with hypertrophic cardiomyopathy at high risk for SCD [4] and in patients at high risk for SCD because of a long QT interval or the Brugada syndrome [5]. An ICD may be useful in preventing SCD in patients with syncope and ventricular tachyarrhythmias associated with poor LVEF, regardless of the result of the electrophysiologic study [6]. In addition, an ICD may be useful in treating survivors of VT or VF as a bridge to cardiac transplantation [7]

ICDs are not effective in treating patients with LV dysfunction scheduled for elective coronary artery bypass graft surgery [8] or in patients who have had an acute MI within 40 days of the procedure [9,10]. In patients receiving ICDs early after MI, factors associated with arrhythmias needing ICD therapy are also associated with a high risk of nonsudden cardiac death, negating the benefit of ICDs [11]. ICDs should also not be used to treat patients with NYHA class IV heart failure despite optimal medical management or in patients with a life expectancy less than 1 year [2].

The Heart Rhythm Society/ACC/AHA expert consensus statement on use of ICDs in patients not included or not well represented in clinical trials was published in July, 2014 [12]. These guidelines recommend use of an ICD in patients with abnormal cardiac biomarkers not thought to be due to MI who otherwise would be candidates for an ICD [12]. These guidelines recommend against use of ICD therapy within the first 40 days after an acute MI in patients with preexisting LV systolic dysfunction [12]. These guidelines recommend an ICD in patients within 40 days of a MI who require non-elective permanent pacing and meet primary prevention criteria for an ICD in whom recovery of LV function is uncertain or not expected [12].

These guidelines recommend an ICD in patients who develop within 40 days of a MI sustained or hemodynamically significant ventricular tachyarrhythmias more than 48 hours after the MI and who do not have ongoing myocardial ischemia [12]. These guidelines state that an ICD can be useful in patients who develop within 40 days of MI sustained or hemodynamically significant VT more than 48 hours after the MI that can be treated by ablation [12]. These guidelines recommend against use of an ICD in patients who develop within 40 days of a MI sustained or hemodynamically significant ventricular tachyarrhythmias with evidence of an ischemic etiology and a coronary anatomy amenable to revascularization [12].

These guidelines state that an ICD can be useful in patients who develop syncope within 40 days of MI thought to be due to ventricular tachyarrhythmias by clinical history, nonsustained VT, or electrophysiologic study [12]. These guidelines recommend against use of an ICD in patients within 40 days of MI listed for a heart transplant or implanted with a LV assist device [12]. ICD implantation can be useful in patients within 90 days of revascularization who previously were candidates for an ICD for primary prevention of SCD who have undergone revasularization unlikely to improve the LVEF to more than 35% and who are not within 40 days of an acute MI [12].

These guidelines recommend an ICD in patients within 90 days of revascularization who have indications for secondary prevention of SCD and an abnormal LVEF [12]. These guidelines recommend an ICD in patients within 90 days of revascularization who have indications for secondary prevention of SCD unlikely related to myocardial ischemia/injury and a normal LVEF [12]. An ICD can be useful in patients within 90 days of revascularization who have indications for secondary prevention of SCD not related to myocardial ischemia/injury subsequently found to have coronary artery disease revascularized with normal LV function [12]. These guidelines recommend against an ICD in patients within 90 days of revascularization resuscitated from cardiac arrest due to a ventricular tachyarrhythmia related to acute MI/injury with normal LV function who undergo complete coronary revascularization [12].

These guidelines recommend an ICD in patients within 90 days of revascularization who need nonelective permanent pacing, have primary prevention criteria for an ICD, and in whom recovery of LV function is uncertain or not expected [12]. These guidelines recommend in patients within 90 days of revascularization with structural heart disease and sustained or hemodynamically significant ventricular tachyarrhythmias not related to acute MI or ischemia [12]. An ICD can be useful in patients who develop within 90 days of revascularization sustained or hemodynamically significant VT that can be treated by ablation [12]. These guidelines state that an ICD can be useful in patients who develop syncope within 90 days of revascularization thought to be due to ventricular tachyarrhythmias by clinical history, nonsustained VT, or electrophysiologic study [12]. An ICD can be useful in patients within 90 days of revascularization listed for heart transplant or implanted with a LV assist device who are not within 40 days of an acute MI [12].

An ICD for primary prevention is not recommended within the first 3 months after the initial diagnosis of nonischemic cardiomyopathy (NICM) [12]. If recovery of LV function is unlikely in patients with NICM, an ICD for primary function can be useful between 3 and 9 months after diagnosis of NICM [12]. An ICD is recommended in patients with less than 9 months from the diagnosis of NICM who require nonelective permanent pacing , meet primary prevention criteria for an ICD, and recovery of LV function is uncertain or not expected [12]. An ICD is recommended in patients with less than 9 months from the diagnosis of NICM with a sustained or hemodynamically significant ventricular tachyarrhythmia [12].

An ICD can be useful in patients with less than 9 months from the diagnosis of NICM with syncope thought to be due to a ventricular tachyarrhythmia by clinical history or documented nonsustained VT [12]. Finally, an ICD can be useful in patients with less than 9 months from the diagnosis of NICM listed for heart transplant or implanted with a LV assist device [12].

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