Editorial

The Post-MADIT II Era: ICD for all Post-infarct Patients with Moderate to Severe Left Ventricular Dysfunction?

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Device therapy has become the preferred treatment for patients who have survived sudden cardiac death. Throughout the last decade, large-scale randomized clinical trials have provided consistent evidence on the clinical efficacy of device therapy. ICD is proven to be superior to anti-arrhythmic drugs in patients with structural heart diseases who suffer from haemodynamically significant ventricular arrhythmias. The role of ICD in primary prevention of sudden death in selected patients with coronary artery disease and left ventricular dysfunction is also widely established after the Multicenter Automatic Defibrillator Implant Trial (MADIT)[1] and the Multicenter Unsustained Tachycardia Trial (MUSTT).[2]

In MADIT, patients with previous myocardial infarction, depressed left ventricular function (ejection fraction <35%) and non-sustained ventricular tachycardia underwent electrophysiology study. Among them, 196 patients with inducible sustained ventricular tachyarrhythmias but not suppressed by procainamide were randomized to receive an ICD or conventional therapy. The ICD group had a 54% reduction in mortality at 2 years, and the benefit was greatest in patients with the lowest left ventricular ejection fraction. The MUSTT trial was designed to compare electrophysiology-guided therapy and no active treatment in high-risk patients with asymptomatic non-sustained ventricular tachycardia. The 2,202 patients with previous myocardial infarction and ejection fraction of 40% or less underwent electrophysiology study before randomization. The non-inducible patients (65%) were followed-up in the registry. The 704 inducible patients (35%) were randomized to receive conventional therapy with no antiarrhythmics or electrophysiologically guided treatment. Patients who remained inducible despite class IA antiarrhythmics, propafenone, or sotalol were randomized to ICD or further drug testing until all patients received either an ICD or an effective drug. At 5 years of follow-up, mortality was 9% in patients who received ICD, 34% in patients treated with an effective drug guided by electrophysiology study, and 32% in patients randomized to no antiarrhythmics. The MUSTT trial confirmed that post-infarct patients with depressed left ventricular function and non-sustained ventricular tachycardia were at high risk for arrhythmic death, and ICD was superior to both electrophysiologically guided therapy and no active treatment.

Both the MADIT and MUSTT trials studied the effect of device therapy in selected high-risk post-infarct populations. Apart from left ventricular dysfunction, non-sustained ventricular tachycardia and inducibility at electrophysiology study were key eligible criteria. To go one step further, in MADIT II, patients with prior myocardial infarction and an ejection fraction of 30% or less were studied.[3] The result of this landmark ICD primary prevention trial was announced in the Annual Scientific Session of the American College of Cardiology this year. Among 1,232 patients with prior myocardial infarction (more than 1 month) and left ventricular ejection fraction of 30% or less were randomized to receive an ICD or conventional medical

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therapy in a 3:2 ratio. No non-sustained ventricular arrhythmias or electrophysiology study was required for enrollment. During an average follow-up of 20 months, the mortality in the ICD group was 14.2% and that of the control group was 19.8%. This study demonstrated that prophylactic ICD offered significant survival benefit in patients with advanced left ventricular dysfunction after myocardial infarction. Subgroup analysis showed that the benefit was greater in patients with age less than 60 years or QRS duration more than 0.15 sec.

There is robust evidence to support that prophylactic device therapy offers survival benefit to patients at high risk of sudden death. However, this therapy is not entirely free of complications. The cost involved is also substantial. In the US, it is estimated that there are approximately 400,000 new MADIT II-alike patients annually. In Hong Kong, if 10% post-infarct patients become eligible for ICD because of the MADIT II data, there will be approximately 300 more implants yearly (Hong Kong Acute Myocardial Infarction Registry data, 1995). The annual cost is nearly 50 million dollars, an amount that is greater than the total sales value of all the ACE inhibitors and AII antagonists used in Hong Kong last year. This does not take into account the cost of replacement of these devices that have an average longevity of 5 years. When the result of the ongoing cost-effectiveness analysis is available, we may have a better picture of how practical it is to apply the MADIT II evidence in our clinical practice. In the long run, it is anticipated that market force and competition may eventually drive down the cost of ICD. In the mean time, prophylactic ICD implantation should be seriously considered in patients with prior myocardial infarction and advanced left ventricular dysfunction, especially in those with a younger age or a wide QRS complex on surface electrocardiogram.

References

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