A prophylactically implanted cardioverter defibrillator did not reduce all-cause mortality after a recent myocardial infarction

Hohnloser SH, Kuck KH, Dorian P, et al. **Prophylactic use of an implantable cardioverter-defibrillator after acute myocardial infarction.** N Engl J Med. 2004;351:2481-8.

QUESTION

In patients who are at high risk for ventricular arrhythmias after a recent myocardial infarction (MI), does a prophylactically implanted cardioverter defibrillator (ICD) reduce all-cause mortality?

METHODS

Design: Randomized controlled trial (Defibrillator in Acute Myocardial Infarction Trial [DINAMIT]).

Allocation: Concealed.*

Blinding: Blinded (central validation committee that classified the deaths as arrhythmic or not arrhythmic in nature).*

Follow-up period: Mean 30 months.

Setting: North America (27 sites) and Europe (46 sites).

Patients: 674 patients 18 to 80 years of age (mean age 62 y, 76% men) who had recently had an MI (6 to 40 d previously) and had a left ventricular ejection fraction ≤ 0.35. Patients were also required to have a standard deviation of normal-to-normal RR intervals ≤ 70 msec or a mean RR interval ≤ 750 msec (heart rate ≥ 80 beats/min) over a 24-hour period measured ≥ 3 days after the infarction. Exclusion criteria included congestive heart failure or New York Heart Association class IV, noncardiac disease that limited life expectancy, and coronary artery bypass grafting after the qualifying infarction scheduled ≤ 4 weeks after randomization.

Intervention: Conventional medical therapy plus prophylactic use of a market-approved, single-chamber ICD (St. Jude Medical, Sunnyvale, CA, USA) (n = 332) or conventional medical therapy alone (n = 342). After ICD implantation, every effort was made to achieve defibrillation with a 10-joule safety margin. Appropriate use of β-blockers, angiotensin-converting enzyme inhibitors, and lipid-lowering drugs was encouraged in both study groups.

Outcomes: All-cause mortality and death from arrhythmic causes. The study had 80% power to detect a difference in all-cause mortality between the groups.

Patient follow-up: 100% (intention-to-treat analysis).

MAIN RESULTS

The groups did not differ for all-cause mortality (Table). However, the rate of death from arrhythmic causes was lower in the ICD group than in the conventional medical therapy group (Table).

CONCLUSION

In patients who are at high risk for ventricular arrhythmias after a recent myocardial infarction, a prophylactically implanted cardioverter defibrillator did not reduce all-cause mortality.

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*See Glossary.

Conventional medical therapy plus implanted cardioverter defibrillator (ICD) vs conventional therapy alone after a recent myocardial infarction, followed for 30 months†

Outcomes	ICD	Conventional medical therapy	RRI (95% CI)	NNH
All-cause mortality	18.7%	17.0%	10% (–20 to 50)	Not significant
			RRR (CI)	NNT (CI)
Arrhythmic mortality	3.6%	8.5%	57% (19 to 78)	21 (12 to 77)

†Abbreviations defined in Glossary; RRI, RRR, NNH, NNT and CI calculated from data in article.

COMMENTARY

Given current evidence, the question is not whether ICD therapy works but how much the risks, benefits, and costs vary among the subgroups of patients who potentially stand to benefit. The stakes are high, especially if prophylactic ICD therapy can prevent sudden cardiac death in patients with left ventricular dysfunction (LVD) (1). The findings of Hohnloser and colleagues appear to contradict those of some previous trials. However, Hohnloser and colleagues enrolled patients within 6 to 40 days after an index MI. As expected, a substantial reduction in arrhythmia-related deaths was observed in the ICD group but this was offset by higher nonarrhythmia deaths. In contrast, most patients in the Multicenter Automatic Defibrillator Implantation Trial (MADIT) I and II trials were recruited over 1 year after the index MI (2). In fact, a retrospective analysis of MADIT II supports the finding that patients may not benefit from ICD therapy early after MI (3).

In patients with LVD after coronary artery bypass grafting, ICD therapy reduced arrhythmia-related deaths by 45% but not all-cause mortality because of a substantially higher rate of nonarrhythmia-related deaths (4). Death from progressive pump failure in these patients may have offset the survival benefits of rapid termination of ventricular tachyarrhythmias. Furthermore, some sudden deaths are thrombotic rather than arrhythmic. Thus, we need more data to help us determine how the effectiveness of ICD treatment varies according to key clinical features, such as time since MI, ejection fraction, and history of coronary revascularization. We also need to know whether concomitant cardiac resynchronization therapy helps to reap the benefits from ICD in these patients. Until then, this study's findings suggest that patients with recent MI and LVD do not enjoy a mortality benefit from ICD treatment.

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