Withholding cardiac defibrillators from elderly patients: evidence-based decision or ageism?

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Sudden cardiac death (SCD) is a major cause of death in patient with cardiomyopathy regardless of the etiology. Specifically, patients with cardiomyopathy and a history of ventricular arrhythmia (VA) are at increased risk. These patients usually are candidates for implantable cardiac defibrillator (ICD) for secondary prevention as the recurrence rate of the VA is very high and mortality benefit with ICD can be seen within the first year after the implantation [1]. However, not all the arrhythmic episodes are fatal, and some patients will not die of an arrhythmic cause. Other cardiac causes (heart failure) and non-cardiac causes (cancer, renal dysfunction) may influence patients' survival and reduce the benefit of an ICD. Therefore, and since the only purpose of the ICD is to save life rather than improving quality of life (QOL), guidelines recommendations for ICD implantation specify the requirement that the patient will have life expectancy of at least 1 year with a reasonable QOL.

ICDs are often underused in elderly patients due to the notion that elderly patients are more likely to die of other comorbidities and this will reduce the benefit of the ICD. However, elderly patients with a history of sustained VA are at increased risk and perhaps ICD can significantly prolong their life.

Healy et al. performed a meta-analysis of the three randomized controlled trials of secondary prevention of ventricular arrhythmia with ICD implantation. While the arrhythmic death rate was similar in both age groups (patients < 75 and ≥ 75 years old), early death due to non-cardiac causes and advance heart failure was seen more frequently in elderly patients, thus the proportion of arrhythmic death was smaller in elderly patients and no statistically significant benefit was seen in the elderly ICD group [2].

In this issue of the journal, Weidner et al. performed a retrospective analysis of 592 elderly patients, defined as 75 years old or older [3]. Primary outcome was recurrence of VA (sustained or non-sustained). Among the secondary outcome, mortality and appropriate ICD treatment were the most important. Follow-up was up to 5 years. Compared to patients younger than 75, elderly patients had higher rates of recurrent arrhythmia and recurrent ICD treatment, both anti-tachycardia pacing (ATP) and shock. This difference was seen due to significantly higher rate of ICD treatment in patients with severely reduced ejection fraction (EF) of 35% or less, while no age-related difference was seen in patients with EF > 35%. All-cause mortality was also increased in the elderly patients. Propensity score match in a smaller group was done to minimize the differences between groups. This analysis resulted in no difference with regard to ICD treatment or mortality. The results of Weidner et al. support the implantation of ICD for secondary prevention in elderly patients.

Several questions need to be addressed:

Why the results of the current study differ from previous meta-analysis?

First, the methodology of the studies is different. Weidner et al. did not use a standard ICD programming and standard criteria to define VA. Selection bias is probably more common in a retrospective study, when the physician may decide

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to implant an ICD for those patients with less comorbidities or that are in a better physical state. This will result in better overall survival and increased chance for recurrent VA.

Second, the current study recruited patients during the years 2002–2016, while the patients in the other studies were recruited earlier. Improvements in the management of heart failure in the recent years can be noticed as 86% and 87% of the elderly patients in the current study were treated with beta blockers and ACE inhibitors, respectively. In contrast, rates of medical treatment in the ICD group in AVID were 46% for beta blockers and 68% for ACE inhibitors. Cardiac resynchronization therapy (CRTD) implantation was not available in AVID, as well as medical treatment with neprilysin inhibitor (sacubitril/valsartan). Thus, current patients with heart failure live longer and the probability for recurrent ventricular arrhythmia is greater.

Third, RCTs included in the meta-analysis had a significantly shorter follow-up (2.3 years vs. 5 years in the current study). In fact, arrhythmic death was higher in elderly (6.7% per year vs. 3.8% per year; $p=0.03$), but the elderly group had much higher proportion of non-arrhythmic death (in the first year, 13.4% vs. 5.4% in patients younger than 75), and overall it diminished the efficacy of the ICD.

Finally, we do not have data on the tachycardia treatment programming in the studies. As was shown in MADIT-RIT [4], programming treatment starting at a low rate (170 bpm) may result in higher rates of ICD treatments for potentially self-terminating arrhythmias.

Is the risk of the implantation procedure higher in elderly patients?

Overall, elderly patients undergoing ICD implantation have similar complication rates as younger patients, except perhaps a slightly increased risk of lead perforation [5]. Another large study registry from Israel similarly did not find an increased risk of complications related to the procedure [6].

What do we learn from the combined data?

Patients with history of sustained VA are at increased risk of recurrence, regardless of their age. Significant comorbidities such as malignancy, renal failure, and advanced symptomatic heart failure reduce the survival of these patients and the benefit of an ICD. The optimal management of elderly patients with history of VA should take into account the presenting symptoms of the patient (i.e., weakness and palpitations vs. syncope and need for resuscitation), comorbidities as well as patients' preferences. Elderly patients with reasonable QOL and life expectancy, especially if their EF is below 35%, are probably best treated with an ICD. Data regarding very elderly patients (i.e., older than 85 years old) are lacking and ICD implantation in this group should be

limited to special cases. Patients at that advanced age should clearly express their desire in prolongation of life.

An ICD was implanted in an elderly patient, and several years later, his or her health/cognitive status declines significantly: what should be done?

Many doctors and patients will be reluctant to discuss the option of ICD deactivation at the time of the implantation. It may be assumed that the elderly patient has a good QOL and normal cognitive function at the time of the ICD implantation, and discussing the option of cognitive decline is difficult at that point. However, occasionally the cognitive and neurological state may deteriorate over time due to the development of neurological conditions such as Parkinson disease and Alzheimer or vascular dementia. Therefore, ICD deactivation should be discussed in scheduled device clinic visits. Tachycardia therapies may be turned off in accordance with the patient and the family preference, to avoid unwanted suffer from ICD shocks. Usually, pacing capabilities are left unchanged to avoid symptomatic deterioration of the patient.

Compliance with ethical standards

Conflict of interest The author declares that there is no competing interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent For this type of study formal consent is not required.

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