The Impact of Diabetes and Comorbidities on the Outcome of Heart Failure Patients Treated With Cardiac Resynchronization Therapy

Implications for Patient Management

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Heart failure (HF) affects 1% to 2% of the population in developed countries, with a marked rise of its prevalence in subjects aged ≥70 years. It has been estimated that ≈15 of 900 million Europeans and ≈5.7 of 300 million US Americans may present HF. It is worrisome to consider that the prevalence of HF is expected to further increase, as a result of the increasing aging of the population. The consequences of HF-related care can be quite high: the costs for HF-related care can come to ≈$40 billion each year.2

Comorbidities were independently associated with higher age, higher New York Heart Association (NYHA) functional class and underlying ischemic heart disease. Diabetes mellitus is a frequent comorbidity among patients with HF because diabetes mellitus not only increases the risk of HF 2.5-fold, on average, but also accelerates its occurrence.7 Diabetes mellitus and CKD have a similar prevalence among HF patients with preserved and reduced left ventricular ejection fraction4 and both may contribute to poorer outcomes.6,8

In the present issue of the journal, Echouffo-Tcheugui et al report on >18,000 patients implanted with a biventricular defibrillator (CRT-D device) using the framework of the National Cardiovascular Data Registry (NCADR). For this report, the implantable cardioverter-defibrillator (ICD) registry data were linked to Medicare claims data, thus providing a picture of patients aged ≥65 years, with a left ventricular ejection fraction ≤35% and a preimplant NYHA class predominantly III, and a QRS duration ≥120 ms, who had been hospitalized for denovo CRT-D implantation in the period 2006 to 2009. At the time of device implantation, patients who were diabetic, on the basis of medical history or new clinical diagnosis, accounted for 38% of the cohort. They were more frequently male, with a higher prevalence of hypertension, as well as of ischemic heart disease and advanced CKD on dialysis. During the post-CRT implant follow-up, patients with diabetes mellitus had a higher mortality than those without diabetes mellitus, both at 1 and 3 years, in agreement with a recent meta-analysis based on 5 studies of CRT in HF. However, these findings have to be analyzed in combination with the evidence derived from randomized studies that CRT is equally effective in reducing mortality versus control in diabetic when compared with nondiabetic patients. These data from the large data set of NCADR contribute to the evaluation of CRT-D in the real world, although, as is well known, registries can have limitations because of selection bias and missing data.

Cardiac resynchronization therapy (CRT) was introduced >20 years ago for selected patients with drug refractory HF on the basis of a series of pioneering experiences performed in Europe, in France,12 and now constitute an effective treatment for appropriately selected patients with moderate to severe and even mild HF.13 The most evident and measurable effect of CRT is the reduction of left ventricular volumes, so-called left ventricular reverse remodeling.12–14 It is noteworthy that the response to CRT in terms of reverse ventricular remodeling and improvement in functional status after CRT implantation was found to be independent from most common comorbidities (including diabetes mellitus and CKD), but diabetes mellitus and CKD had an important impact on outcome, with a 3-fold increase in mortality risk.14

In a real-world long-term registry of around 700 CRT-D patients followed for 4 years, Boriani et al found a 3-year...
Patient surveillance after implant of a CRT-D device has also to consider the risk of device system infections. In the report by Echouffo-Tcheugui et al.,9 no significant difference was found between diabetic and non-diabetic patients in the occurrence of device-related mechanical complications or device-related infections within 90 days after implant, even when other patient characteristics were taken into account. These data need to be interpreted in light of the observational nature of this study, and the actual risk of device-system infection in diabetic patients probably deserves some considerations. In the literature, there is evidence that diabetes mellitus is a significant predictor of infection, a risk that is usually amplified by the association with other factors, such as device replacement, reintervention for lead dislodgement, CKD, anticoagulant drug use, corticosteroid use, postoperative hematomata, etc.20 There are many possible approaches for assessing the impact of diabetes mellitus or of other risk factors on the risk of device infections, including retrospective studies, case–control studies, or prospective cohorts, and this may explain the partial discrepancy between the report by Echouffo-Tcheugui et al9 and other literature data, recently the subject of a systematic review and meta-analysis.20

In summary, HF has a major impact on patient survival and quality of life as well as on costs for the healthcare system and the community.2 Improved knowledge about the impact of comorbidities such as diabetes mellitus will be crucial to offer to patients with HF new models of care that could benefit from innovative technologies, such as telemonitoring, currently available in CRT-D systems. The approach to these complex issues has to be multidisciplinary, in line with the concepts of Health technology assessments, trying to offer, if possible, win–win solutions to all stakeholders.19

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References


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