ventricular pacing (RVP) is associated with heart failure (HF). However, data from large epidemiological studies supporting this are lacking.
Purpose: The objective of the current study is to investigate the risk of HF due to after implantation of a RVP and factors associated with this risk.
Methods: All patients with a pacemaker implanted due to indication of advanced atrioventricular block between 2000 to 2014 without a known history of HF were identified using Danish nationwide registries. Outcome was the cumulative incidence of HF including fatal HF within the first 2 years of device implantation with non-HF mortality and coronary artery revascularization as competing events within the first 2 years. Cause-specific Cox regression analysis was performed to report hazard ratios (HR) for factors associated with HF. The model included age in 10-years intervals from age 50 onwards, gender and the following preexisting conditions: hypertension, diabetes, chronic kidney disease (CKD), ischemic heart disease and myocardial infarction (MI).
Results: A total of 35,071 had a RVP device implanted during 2000–2014. Of these, 27,670 (78%) did not have a history of HF and were included. The median age was 78, 56% were male, 3% had diabetes, 15% had hypertension and 15% had a prior history of ischemic heart disease. The cumulative incidence of HF including fatal HF was observed in 3,188 (11.5%) patients (Figure 1) and the competing event of non-HF mortality or coronary artery revascularization was observed in 3,352 (12%). The risk of HF after pacemaker implantation increased with increasing age (Figure 2). Other factors associated with increased risk of HF were (Figure 2): male sex (HR 1.33, 95% CI 1.24 to 1.43); presence of CKD (HR 1.64, 95% CI 1.29 to 2.09) and prior MI (1.77, 95% 1.50 to 2.09). The cumulative incidence of HF after RVP implantation was 18.7% (95% CI 16.8–20.7) in patients with prior MI (n=1,560) versus 11.1% (95% CI 10.7–11.5) in patients without prior MI (n=26,110).

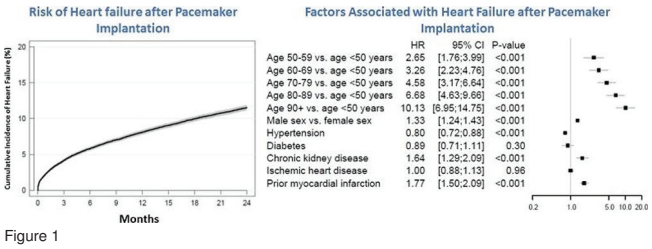

Figure 1

Conclusions: There is an about 12% risk of development of HF at the end of 2 years in patients implanted with RVP which increases substantially with increasing age.

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Heart failure-related hospitalizations in ICD/CRT-D recipients following device replacement or upgrade: insights from the DECODE registry

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Background: Heart Failure (HF)-related hospitalizations represent the main expenditure in the management of patients (pts) with ICD/CRTD. The event rate after device replacement or upgrade is unknown.
Purpose: To report HF-related hospitalizations within 12-months after ICD/CRTD replacement or upgrade, to identify possible predictors and investigate the association with short-term mortality.
Methods: Detect long-term complications after ICD replacement (DECODE) was a prospective, single-arm, multicenter cohort study aimed at providing an estimate of medium- to long-term complications in a large population of ICD pts undergoing replacement/upgrade of ICD or CRT-D from 2013 to 2015. We prospectively analyzed all clinical and survival data of these patients at 12-month follow-up. Fatal and nonfatal HF events requiring hospitalization (HFH) after ICD replacement/upgrade were retrieved.
Results: A total of 983 pts were enrolled (age 69±12 years, male gender 76%, ischemic etiology 55%, NYHA class III/IV at replacement 24%, ejection fraction 36±12%). There were 900 (92%) device replacements: 446 ICD to ICD (group ICD) and 454 CRT-D to CRT-D (group CRT-D); an upgrade procedure from ICD to CRT-D (group UPG) was performed in 83 (8%) pts. During a mean follow-up of 353±49 days, 66 (6.7%) pts died and 52 (5.3%) pts had 85 HFH, with an overall HFH rate of 8.9 events/100yrs (95% CI: 7.1–11). Mean time to first HFH was 159±104 days. HFH rate was significantly higher in UPG pts (25.4 events/100yrs, 95% CI: 15.5 to 39.2) versus both ICD pts (5.1, 3.2 to 7.7; p<0.0001) and CRT-D pts (9.8, 7.1 to 13.2; p=0.0003), whereas ICD pts had a lower HFH rate versus CRTD pts (p=0.0099). At multivariate Cox regression analysis adjusted for baseline confounders only LVEF ≤35% at the time of replacement remained associated with HFH at 12-month follow-up (HR=2.08, 95% CI: 1.02–4.23; p=0.044). Mortality at 1 year follow-up was significantly higher in pts with HFH (17 out 52 pts, 32.7%) versus pts without HFH (49 out 931, 5.3%, p<0.0001). HFH after ICD replacement was strongly associated with death at 12 months (HR=6.1, 95% CI: 3.92 to 9.6; p<0.0001).
Conclusion: Results from the present study suggest that CRT-D upgrade procedures are associated with a higher occurrence of HFH as compared with CRT-D or ICD replacement. Persistence of severe systolic dysfunction (lower LVEF) dictates the adoption of specific HF management programs to improve the outcome of UPG patients.

ADVANCES IN DEVICE THERAPY: FOCUS ON SAFETY

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Incidence and predictors of cardiac implantable electronic device infection: long-term follow up in a complete, nationwide Danish cohort

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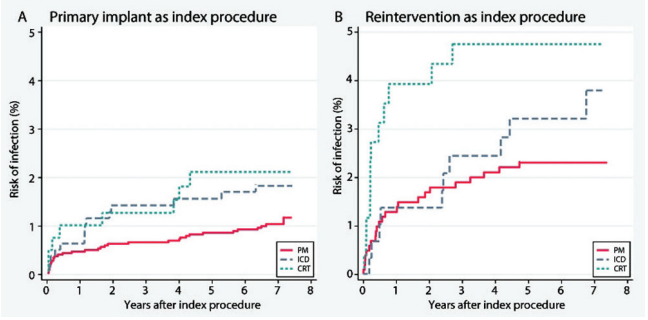
Introduction: Cardiac implantable electronic devices (CIED), including pacemakers (PM), implantable cardioverter defibrillators (ICD) and cardiac resynchronisation therapy devices (CRT), are implanted worldwide in increasing numbers. CIED infection is a complication associated with increased morbidity and health care costs, and according to some studies increased mortality.
Purpose: We aimed to provide data on incidence of CIED infection leading to CIED extraction, and to identify predictors of CIED infection during long-term follow up in a complete, contemporary and nationwide cohort of consecutive CIED patients.
Methods: A nationwide, cohort study was performed including all patients who underwent a CIED procedure in Denmark from May 2010 to April 2011. Data came from the Danish Pacemaker and ICD Registry. Cumulative incidence proportions for CIED infection adjusted for competing risk (death) were generated according to CIED and procedure type. Cox proportional hazard regression analysis was used to estimate hazard ratios (HRs) and 95% confidence intervals (CI) for the association between selected predictors and CIED infection.
Results: The study population consisted of 5,918 consecutive patients; women: n=2,211, median age: 74 (interquartile range 65–83) years, PM: n=4,189, CRT-P or CRT-D: n=654, ICD: n=1,075, first implant as index procedure: n=4,355, reintervention as index procedure: n=1,563.
During median follow up time of 6.1 (2.8–6.9) years, a total of 100 patients (1.7%) had CIED infection leading to extraction. CIED type extracted was PM (n=56), ICD (n=24) or CRT (n=20). All leads were extracted in total, except in two patients with single-lead ventricular PMs in whom leads were abandoned. Risk of infection was low for primary implants as index procedure, especially PM implantations, Figure A. Risk of infection was high with reintervention as index procedure, especially CRT, Figure B.
In multivariate analyses, increased risk of CIED infection was observed in patients who underwent reintervention as index procedure (aHR 2.2; 95% CI 1.5–3.3, p value <0.001), had CRT (aHR 1.8; 95% CI 1.0–3.0, p value 0.04), C-reactive protein≥20.0 mg/L within 1 day of index procedure (aHR 1.9; 95% CI 1.1–3.4, p value 0.03) or had wound infection treated with antibiotics (aHR 3.0; 95% CI 1.1–8.1, p value 0.03). Patients older than 80 years had decreased risk of CIED infection (aHR 0.4; 95% CI 0.2–0.8, p value 0.01). After CIED infection, 81/100 patients (81%) underwent CIED reimplantation.



Cumulative incidence of CIED infection

Conclusions: In a nationwide cohort of consecutive CIED patients, risk of CIED infection was low (1.7%) during long-term follow up. These results may be used as benchmark for future CIED treatment. Reinterventions carried a higher risk of CIED infection and thus reducing risk of reintervention by meticulous surgical technique and proper CIED selection at primary implant is essential.