Purpose: To analyze the experience with S-ICD at our referral centre for treatment of CIED complications
Methods: From April 2011 to December 2017, 95 pts (78 M), underwent S-ICD implantation. 47 pts received an S-ICD as first CIED while 48 (50.5%) were implanted after a T-ICD explant for infection (30), malfunction (14), venous obstruction (3), lead thrombosis (1).
Results: All the patients were successfully implanted. The indications for T-ICD to S-ICD shift were: young age (69%), infectious risk (62.5%), previous lead malfunction (29%), venous obstruction (25%), abandoned lead interference (8%). Two or more S-ICD "drivers" were present in 77% of pts. "De novo" and "previously explanted" groups did not differ according to effectiveness and complication rate. In 3 explanted pts the S-ICD was replaced with a T-ICD due to inappropriate shocks, recurrent MVT episodes and chronic pain.
Conclusions: S-ICD appears particularly appropriate for T-ICD explanted pts without pacing indications. S-ICD therapy is equally safe and effective in "de novo" and "previously explanted" groups.

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Digitalization of SICD charge events identifies pre-charge electrogram variants leading to oversensing

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Introduction: Oversensing by the subcutaneous implantable cardioverter defibrillator (S-ICD) can lead to appropriate and inappropriate shocks. Shocks by the S-ICD are now predominantly due to ventricular tachyarrhythmias as the implant technique and sensing algorithm upgrades have evolved. Still, non-cardiac and cardiac over-sensing persist leading to charges and shocks.
Purpose: To evaluate a test set of real life S-ICD charge/shock events in order to identify pre-charge patterns that may lead to oversensing.
Methods: 42 remote S-ICD charge events (Latitude, Boston Scientific) in 20 subjects were adjudicated. The test set was divided into over-sensed, under-sensed and normal sensed groups to assess SICD algorithm response. The stored electrogram (EGM) data was digitally quantified by pixel units using the Page Ruler (Google) application in order to identify EGM aberrations. Using the marker channel and Page Ruler, aberrations were quantified in EGMs 20 seconds pre-charge as: noise (channel marked and unmarked), baseline wander, QRS/T wave change. Duration in aberration pre charge (% in msec) was measured. Time from derangement in the electrogram to first incidence of oversensing was measured (milliseconds).
Results: Pre charge EGM aberrations were seen in 12/20 (60%) subjects (marked noise = 11; unmarked noise = 11; baseline wander = 7; QRS/T change = 10). Oversensing of cardiac signals was seen in 10 subjects and 22/42 charge events (52%). Unmarked noise or baseline wander in the precharge EGM was present in 9/10 with oversensing of cardiac signals. Baseline wander was not seen in the normal sensing subjects. Marked noise (3/10) and unmarked noise (1/10) was measured in normal sense patients. Heart rate, ectopy or QRS/T wave change pre oversensing did not influence eventual poor sensing. SICD marker channel under-sensed during 2 events (5%) only after the precharge EGM marked noise. The percentage of time in aberration pre charge was significantly more in oversensing events (64% v. 3.6%; $p<0.5$).
Conclusions: Noise is common during SICD charge events. A pattern of unmarked noise and baseline wander influences subsequent SICD over-sensing of cardiac signals leading to appropriate and inappropriate charges. This may have impact with future machine learning algorithms.
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Preliminary study of RESYS: computer alert system for device implantation

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Introduction: Left ventricular (LV) dysfunction is associated with high morbidity and mortality rates. In selected patients these outcomes can be ameliorated by cardiac device (CD) implantation. The rate of implants in Portugal is below the European average, one of the main causes being the absence of identification and referral of the possible candidates.
Objective: To validate the utility of a computer alert system (RESYS) as a tool to identify candidates for CD implantation.
Methods: A computer application (RESYS) was developed, as a plug-in to the database program most widely used in Portuguese Cardiology Departments. This application aimed to identify patients with LV ejection fraction (LVEF) <35%. The alerts generated by the system during 3 consecutive months, as well as all available clinical information, were evaluated. Based on this, patients were classified as: 1) without indication for CD implantation and 2) potential candidates for implantation.
Results: In 3 months (January to March 2017) 337 patients were detected (mean age: 69±12 years, 75% men). Ischemic heart disease was the most frequent aetiology (54%), followed by dilated cardiomyopathy (29%) and valvular heart disease (5%). Seventy nine patients (23.4%) had no indication for CD implantation: 19 by subsequent recovery of LVEF; 23 due to old age or the presence of major comorbidities; 3 with habitual NYHA functional class IV in the absence of electrocardiographic criteria for CRT implantation; and 34 patients by documentation of discrepancy between the value of LVEF recorded in the database and the one that was obtained by imaging modality. Two hundred and fifty eight patients were identified as possible candidates for CD implantation. Of these, 164 (63.6%) were already carriers of CD or underwent implantation during the follow-up period. The remaining 94 patients (25% of the total population identified by RESYS) were considered possible candidates for implantation (31 for implantation of ICD, 8 for CRT-P and 26 of CRT-D). In the group of patients considered candidates for CD implantation, 8.5% died without referral for implantation. The causes of death were sudden cardiac death in 37.5%, heart failure related in 25% and in 50% the cause was unknown.
Conclusions: The lack of identification and referral of patients for CD implantation is responsible for high mortality and morbidity rates. The RESYS system allows automatic identification of patients who are candidates for CD implantation, in whom this therapy has not been weighted.