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Stress echocardiography and early identification of candidates for implantable defibrillators

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Introduction: Despite efforts to determine other predictors of sudden cardiac death after myocardial infarction, heart failure, expressed as a reduction in left ventricular ejection fraction (LVEF), remains the strongest indicator of increased risk. International guidelines recommend that patients with LVEF $\leq 35\%$ 6–12 weeks post-infarction should be considered for implantable cardioverter defibrillator (ICD) therapy. Low-dose dobutamine echocardiography (LDE) is a safe method to detect viability in a stunned myocardium.

Purpose: To investigate if LDE early post-infarction could identify ICD candidates before discharge after acute myocardial infarction.

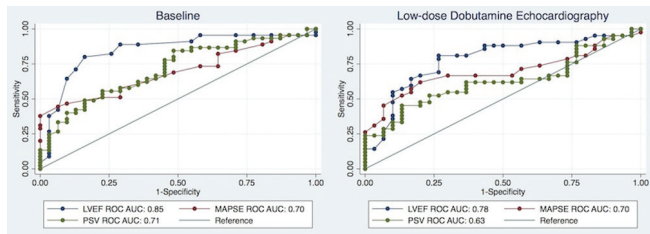
Methods: Ninety-six patients with LVEF $\leq 40\%$ after myocardial infarction were investigated by echocardiography and LDE before discharge. Follow-up echocardiography was performed after 3 months. LVEF, mitral annular plane systolic excursion (MAPSE) and peak systolic velocity (PSV) was determined for each examination.

Results: Among all study patients, 80 (83%) completed both the LDE and the follow-up echocardiography. Among the complete cases there were 32 (40%) patients who met the ICD criteria of LVEF $\leq 35\%$ at 3 months. For these patients, LVEF, MAPSE and PSV were significantly lower than for those patients who recovered (table). The area under the ROC curves (ROC AUC) was 85% for baseline LVEF to predict non-recovery. None of the other variables had higher ROC AUC (figure).

Baseline echocardiography and LDE

	LVEF $\leq 35\%$ at 3 months n=32	LVEF $> 35\%$ at 3 months n=48	p
Baseline Echocardiography			
LVEF, %, median [IQR]	28 [24, 32]	35 [33, 39]	<0.001
MAPSE, mm, mean \pm SD	6 \pm 1	8 \pm 2	0.003
PSV, cm/s, mean \pm SD	3.4 \pm 0.8	4.1 \pm 1.0	0.002
Baseline LDE			
LVEF, %, median [IQR]	33 \pm 10	44 \pm 10	<0.001
MAPSE, mm, mean \pm SD	7 \pm 1	9 \pm 2	0.005
PSV, cm/s, mean \pm SD	4.6 \pm 1.1	5.4 \pm 1.8	0.042

LVEF = left ventricular ejection fraction, MAPSE = mitral annular plane systolic excursion, PSV = peak systolic velocity, LDE = low-dose dobutamine echocardiography, IQR = inter-quartile range.



ROC Baseline Echocardiography and LDE

Conclusions: Although patients who met the ICD criteria of LVEF $\leq 35\%$ at 3 months after myocardial infarction had lower LVEF, MAPSE and PSV on baseline echocardiography and LDE, the LDE did not add additional value in predicting non-recovery.

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Long-term single-center experience of transvenous defibrillator therapy in children and adolescents

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Background: Implantable cardioverter-defibrillator (ICD) systems are established therapy for prevention of sudden cardiac death. Long-term data on ICD systems in children and adolescents is rare. The present study displays a long-term single-center follow-up of children and adolescents with transvenous ICD systems.

Methods and results: The present study represents a single-center experience of patients younger than 18 years who were implanted with an ICD between 1994 and 2013. 58 patients were included in this study. Follow-up data included in-house follow-up as well as examinations of collaborating specialists. Mean age at implantation was 14.0 \pm 3.3 years and 33 patients (56.9%) were male. A transvenous ICD system was implanted in 54 patients (93.1%) while 2 patients (3.5%) received an epicardial ICD system and another 2 patients (3.5%) were implanted with a subcutaneous ICD system. In 33 patients (56.9%) electrical heart disease or idiopathic ventricular fibrillation represented the underlying condition of ICD implantation. Median follow-up duration was 70 months (45; 94). 3 patients

(5.2%) had died during their observation period. None of these deaths was associated with ICD failure. Inappropriate shock delivery was recorded in 17 patients (29.3%). Supraventricular tachycardia represented the most frequent cause of inappropriate shock delivery (9 patients, 52.9%). T-wave oversensing led to inappropriate shock delivery in 3 patients (17.6%). In 5 patients (29.4%), lead failure caused inappropriate shock delivery. Of note, during follow-up lead failure was reported in 15 patients (25.9%) leading to surgical revision.

Conclusion: ICD therapy in children and adolescents is effective for prevention of sudden cardiac death. The rate of appropriate shock deliveries was significantly higher as compared with large ICD trials. Inappropriate therapies occurred frequently. In particular supraventricular tachycardia, T-wave oversensing and lead failure were responsible for these episodes.

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Life with an implantable cardioverter defibrillator (ICD): patients perspective

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Background: Implantable cardioverter defibrillators (ICD) were developed for primary and secondary prevention of sudden cardiac death. This study attempts to understand the perspectives of recipients who received ICD, like for eg. do ICD-recipients (1) feel safer after implantation, (2) do they consider their decision for an ICD-implantation as right, and (3) have they considered a deactivation of the ICD-Therapy in the event of end-of-life situation (EOL).

Methods: Consecutive recipients of ICDs were examined during routine outpatient follow-up (FU) visits. Subjects were asked to complete a questionnaire, their quality of life (QOL) was assessed with the Minnesota Living with Heart Failure Questionnaire (MLHFQ) and with the Hospital Anxiety and Depression Scale (HADS).

Results: Out of the 423 recipients (41% CRT-ICD) included in this study, 349 (83%) were recipients with a primary prevention indication, 339 (80%) with history of ischemic cardiomyopathy. While the mean age of the cohort was 68 \pm 11 years, 342 recipients (81%) were male, the mean ejection fraction was 41 \pm 12%, and the severity of heart failure symptoms graded according to NYHA classification was 1.8 \pm 0.6. Mean QOL-score was 29.4 \pm 20.3 points and mean HADS-score was 8.7 \pm 7.3 points, seventy one (17%) recipients reported having received a shock during a mean FU of 64 \pm 44 months. Although 361 (87.4%) recipients reported feeling secure and safe, those who received shocks were reported to be significantly less secure (79% versus 89%; $p < 0.01$). While most recipients (90%) felt that their decision for ICD-implantation was right, younger recipients (<69 years) expressed their doubts (12% versus 6%; $p = 0.03$). Only a minority of recipients (31%) considered ICD-deactivation during EOL, and this was significantly more frequently considered by younger recipients (42% versus 29%; $p = 0.02$).

Conclusion: Most ICD recipients felt safer following ICD-implantation and judged their decision for ICD as right. Only a minority considered ICD-deactivation in end-of-life situations.

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Cardiac implantable electrical devices in patients with hypertrophic cardiomyopathy: single center implant data extracted from the Swedish Pacemaker and ICD Registry

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Background: The Swedish Pacemaker and Implantable Cardioverter Defibrillator (ICD) Registry provides a highly representative, real-time picture of the use of cardiac implantable electrical devices (CIED) in Sweden.

Purpose: We used the Swedish Pacemaker and ICD Registry to extract retrospective data on CIED first implants in patients with hypertrophic cardiomyopathy (HCM) at the University Hospital.

Methods: Data on pacemaker, ICD e cardiac resynchronization therapy (CRT) first implants at the University Hospital from 2005 to 2016 were extracted from the web-based Swedish Pacemaker and ICD Registry by the Registry administrator. Only clinical and technical information of implants performed in HCM patients were selected. Expanded data concerning patient echocardiographic characteristics were obtained by review of hospital recordings.

Results: The number of first pacemaker implants in HCM patients from 2005 to 2016 was 74 (1.2% of the total number of pacemaker implants). The mean age of HCM patients receiving a pacemaker was 71 \pm 10 years. Pacemaker implants were uniformly distributed between men (49%) and women (51%). Dual chamber pacemakers with or without CRT properties were prevalent (in 11% and 88% of the patients, respectively). The number of first ICD implants in HCM patients was 99 (4.8% of the total number of ICD implants). The mean age of HCM patients receiving an ICD was 53 \pm 15 years. Most patients were males (70%). Sixty-five (66%) patients were implanted for primary prevention of sudden cardiac death. Dual-chamber ICDs with or without CRT were implanted in 21% and 65% of the ICD-implanted patients, respectively. Alcohol septal ablation was performed in 14