ICD Implantation and Follow Up Five Years Registry and Comparative Study With Antiarrhythmic Drugs

Thesis Submitted by

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Abstract

Background: The implantable cardioverter-defibrillator (ICD) has emerged as the primary nonpharmacologic option for many patients who are at continuing high-risk for fatal ventricular tachyarrhythmias.

Aim of the work: Our aim was to follow-up the patients with implanted ICDs, to assess the efficacy of ICD therapy,its impact on survival, quality of life, and monitor for its related complications.

Methodology: The present study included 75 patients (63 males and 12 females), their mean age was 47.6±16.1 years. The mean LVEF was 43.12±15.8%. Out of the 75 pts studied, 10 had structurally normal hearts. Of the remaining 65 pts; IHD (without dilatation) was present in 6, ICM in 29, idiopathic DCM in 19, RHD in 3, congenital heart disease in 2, HOCM in 3 and ARVD in 2 pts, and one pt with Brugada syndrome. All patients were followed-up for a mean period of 54.00±34.4 months.

Results:

- Non-significant change in LVEF% before and after ICD implantation (43.12% vs 45.35%, respectively), however, pts with CRT-D showed significant improvement in LVEF (27.29%before vs 39.5% after implantation, p value:0.02).

- Non-significant improvement in NYHA class before and after ICD implantation. However,pts with CRT-D showed significant improvement in NYHA class (p value:0.05).

- ICD-related complications comprised: (1) *Peri-operative* in 26.6% of pts, (2) *Short-term* in 33.3% of pts, and (3) *Long-term* in 25.3% of pts.

The incidence of inappropriate detection was 25.3% with the commonest cause is inappropriate settings in 17.3% of pts. AF comprised the commonest cause of inappropriate therapies (10.6%). Inappropriate cardioversion shocks occurred in 12% of pts vs. 9.3% for inappropriate ATP therapies.

24% of the ICD recipients were non users,with remarkable higher prevalence of ischemia in those who received ICD therapy specially in pts with cardiomyopathy.

Highly significant reduction in frequent hospital readmissions post-implantation compared to pre-implantation (41.3% vs. 96%, respectively).

Follow-up of pts showed 1st year survival of 93%, 2nd year survival of 89%, 3rd year survival of 89%, and 1st year freedom of SCD of 98%. Cardiac death occlusion 20% of pts (12% by pump failure and 4% by incessant VT,and 4% combined).

In conclusion: ICDs have no impact on LVEF or NYHA class except in pts with CRT-D, however there was significant reduction in hospital admission following ICD implantation & high survival rate. Regular follow up schedules is the corner stone in management of these pts for detection of problems and appropriate programming.

Key words: ICD, VTs, dilated crdiomyopathy.

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List of Abbreviations

AAD(s)	**:**	Antiarrhythmic drug(s)
AADRx	**:**	Antiarrhythmic drug therapy
ACC/AHA	**:**	American College of Cardiology/American Heart Association
AF	**:**	Atrial fibrillation
AMI	**:**	Acute myocardial infarction
ARVD	**:**	Arrhythmogenic right ventricular dysplasia
ATP	**:**	Antitachycardia pacing
AV	**:**	Atrioventricular
AVID	**:**	Antiarrhythmics Versus Implantable Defibrillator trial
AVR	**:**	Aortic valve replacement
BBB	**:**	Bundle branch block
BEOL	**:**	Battery end of life
BOL	**:**	Beginning of life
bpm	**:**	beat per minute
CABG	**:**	Coronary artery bypass graft
CABG patch	**:**	Coronary Artery Bypass Graft Trial
CAD	**:**	Coronary artery disease
CASH	**:**	Cardiac Arrest Study, Hamburg trial
cc	**:**	cubic centimeter
CHF	**:**	Congestive heart failure
CIDS	**:**	Canadian Implantable Defibrillator Study trial
CMS	**:**	US centers for Medicare and Medicaid Services

COMPANION	:	Comparison of Medical Therapy, Pacing, and Defibrillation in Heart Failure
COP	:	Cardiac output
CPR	:	Cardiopulmonary resuscitation
CPVT		Catecholaminergic polymorphic ventricular tachycardia
CRT	:	Cardiac resynchronization therapy
CRT-D	:	Cardiac resynchronization therapy with defibrillator
CRT-P	:	Cardiac resynchronization therapy with permanent pacemaker
CV	:	Cardioversion
CVS	:	Cerebrovascular stroke
DAD	:	Delayed After Depolarization
DAVID	:	Dual chamber and VVI Implantable Defibrillator
DCM	:	Dilated cardiomyopathy
DEFINITE	:	Defibrillators in NonIschemic Cardiomyopathy Treatment Evaluation
DFT(s)	:	***Defibrillation threshold(s)***
DINAMIT	:	Defibrillator in Acute Myocardial Infarction Trial
DVT	:	Deep venous thrombosis
EAD		Early After Depolarization
EAS	:	Electronic article surveillance
ECG	:	Electrocardiography
EF	:	Ejection fraction
EGM(s)	:	Electrogram(s)
EMI	:	Electromagnetic interference
EOL	:	End of life
EP	:	Electrophysiology

ERI	**:**	Elective replacement indicator
FDA	**:**	Food and Drug Association
HD	**:**	Heart disease
HF	**:**	Heart failure
HOCM	**:**	Hypertrophic obstructive cardiomyopathy
HR	**:**	Heart rate
HRV	**:**	Heart rate variability
ICD(s)	**:**	***Implantable cardioverter-defibrillator(s)***
ICM	**:**	Ischemic cardiomyopathy
IHD	**:**	Ischemic heart disease
IVF		Idiopathic ventricular fibrillation
J	**:**	Joule
Kg	**:**	Kilogram
LECV(s)	**:**	Low-energy cardioversion(s)
Li/SVO	**:**	Lithium silver vanadium oxide
LQTS	**:**	Long QT syndrome
LV	**:**	Left ventricle
LVEDV	**:**	Left ventricular end-diastolic volume
LVEF	**:**	Left ventricular ejection fraction
LVESV	**:**	Left ventricular end-systolic volume
M	**:**	Meter
MADIT	**:**	Multicenter Automatic Defibrillator Implant Trial
MADIT CRT	**:**	Multicenter Automatic Defibrillator Implant Trial with Cardiac Resynchronization Therapy
MADIT II	**:**	2nd Multicenter Automatic Defibrillator Implant Trial
MI(s)	**:**	Myocardial infarction(s)
min	**:**	Minute

min^{-1}	**:**	per minute
MIRACLE ICD	**:**	Multicenter InSync ICD Randomized Clinical Evaluation
MIRACLE ICD II	**:**	2^{nd} Multicenter InSync ICD Randomized Clinical Evaluation
mL	**:**	Milliliter
mm	**:**	Millimeter
MRI	**:**	Magnetic resonance imaging
ms	**:**	Millisecond
MUSTT	**:**	Multicenter UnSustained Tachycardia Trial
mV	**:**	Millivolt
MVT(s)	**:**	Monomorphic ventricular tachycardia(s)
NASPE	**:**	North American Society of Pacing and Electrophysiology
NIPS	**:**	Noninvasive programmed stimulation
NISCM	**:**	Non-ischemic cardiomyopathy
NSR	**:**	Normal sinus rhythm
NYHA	**:**	New York Heart Association
OMT	**:**	Optimal medical therapy
OMIM		Online Mendelian Inheritance in Man
PACMAN	**:**	Pacing for Cardiomyopathy
PCI	**:**	Percutaneous coronary intervention
PG(s)	**:**	Pulse generator(s)
Pt(s)	**:**	Patient(s)
PVCs	**:**	Premature ventricular contractions
PVT	**:**	Polymorphic ventricular tachycardia
QoL	**:**	Quality of life
QTc		Corrected QT

RA	**:**	Right atrium
RBBB	**:**	Right bundle branch block
REVERSE	**:**	Resynchronization Reverses Remodeling in Systolic Left Ventricular Dysfunction
RF	**:**	Radiofrequency
RHD	**:**	Rheumatic heart disease
RRR	**:**	Relative risk reduction
RV	**:**	Right ventricle
RVOT	**:**	Right ventricular outflow tract
RyR2		Ryanodine receptor
SAECG	**:**	Signal-averaged electrocardiogram
SC	**:**	Subcutaneous
SR		Sarcoplasmic reticulum
SCD(s)	**:**	Sudden cardiac death(s)
SCD-HeFT	**:**	Sudden Cardiac Death in Heart Failure Trial
SCV	**:**	Subclavian vein
sec.	**:**	second
SHD	**:**	Structural heart disease
ST	**:**	Sinus tachycardia
SVC	**:**	Superior vena cava
SVT(s)	**:**	Supraventricular tachycardia(s)
T.B.	**:**	Tuberclosis
TCL	**:**	Tachycardia cycle length
ULV	**:**	Upper limit of vulnerability
V	**:**	Volt
V. flutter	**:**	Ventricular flutter
$\mathbf{V}^{\bullet}_{\mathbf{max}}$		Rate of rise of action potential upstroke

VecToR	**:**	Ventricular Resynchronization Therapy Randomized Trial
VF	**:**	Ventricular fibrillation
VO_2	**:**	Oxygen consumption
vs.	**:**	versus
VSD	**:**	Ventricular septal defect
VT(s)	**:**	Ventricular tachycardia(s)
V-V	**:**	Ventricle to ventricle
WPW	**:**	Wolf Parkinson White syndrome
Yr (s)	**:**	Year (s)

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