The Utility of Ventricular Premature Burden Detected by Ambulatory ECG Monitoring in Patients with Dilated Non Ischemic Cardiomyopathy for Risk Assessment of Lethal Ventricular Arrhythmias

Thesis

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List of Contents

List of Tables

List of Figures

List of Abbreviations

Abb.	Full term
AMI	*Acute MI*
ACCF	*American College of Cardiology Foundation*
AHA	*American heart association*
AVID	*Amiodarone versus ICD*
BRS	*Baroreceptor sensitivity*
CAD	*Coronary artery disease*
CHF	*Congestive heart failure*
CIEDs	*Cardiac implanted electronic devices*
CRT	*Cardiac resynchronization therapy*
DCM	*Dilated cardiomyopathy*
ECG	*Electrocardiographic monitoring*
HF	*Heart failure*
HRV	*Heart rate variability*
ICD	*Implantable cardioverter defibrillator*
LBBB	*Left bundle branch block*
LV	*Left ventricular*
NIDCM	*Non ischemic dilated cardiomyopathy*
NSVT	*Non sustained ventricular tachycardia*
NYHA	*New York Heart Association*
PES	*Programmed electrical stimulation*
PVCs	*Premature ventricular contractions*
QALYs	*Quality-adjusted life-years*
QTd	*QT dispersion*
RFA	*Radiofrequency catheter ablation*
ROC	*Receiver operating characteristic curve*
SAECG	*Several groups have evaluated the performance of the signal averaged ECG*
SCD	*Sudden cardiac death*
TAPSE	*Tricuspid annular plane systolic excursion*
TWA	*T Wave Alternans*

List of Abbreviations cont…

Abb.	Full term
VES	*Ventricular extrasystoles*
VPBs	*Ventricular premature beats*
VT	*Ventricular tachycardia*
VT/VF	*Ventricular tachycardia or ventricular fibrillation*

Abstract

Concerning the echocardiographic criteria it showed no differences between both groups (C&D).

Regarding the QRS morphology there was no relation seen between patients who completed their 6 months follow up and patients who had endpoints, however the majority of both groups had LBBB and this could be explained by the high proportion of patients who had received CRT in our study.

On basis of Holter data, patients with higher PVC burden where at risk of endpoints in our study with a p=0.006 comparing both groups (C&D) with a 48% sensitivity and 91.43 specificity with a 3279 PVCs /24 hours cut off on Roc curve, also regarding the PVCs couplet, VT runs and Lown's grade, all showed strong predictive value of endpoints with p=<0.001 with Roc curve of Lown's grade showing 88% sensitivity and 71.43 specificity.

Keywords: Ventricular tachycardia- Ventricular premature beats- Ventricular extrasystoles- Radiofrequency catheter ablation - Coronary artery disease

INTRODUCTION

Dilated cardiomyopathy (DCM) is an important cause of sudden cardiac death (SCD) and heart failure (HF). Different causes can lead to DCM, including inherited, infectious, and inflammatory diseases. However, the majority of cases remain unexplained after a thorough review for secondary cause ***(Lakdawala et al., 2013)***.

Premature ventricular contractions (PVCs) are common arrhythmia with an estimated prevalence of 1% to 4% in the general population on standard 12-lead ECG and between 40% and 75% of subjects on 24- to 48-hour ECG monitoring ***(Ng, 2006)***. They are often seen in association with structural heart disease and represent increased risk of SCD ***(Messineo, 1989)*** which is the final event in approximately 35–50% of patients with chronic heart failure ***(Packer, 1985)***. The prevalence and complexity of ambulatory ventricular arrhythmias increase dramatically as LV function deteriorates ***(Califf et al., 1982).*** Numerous studies have shown an independent direct relationship of complex cardiac arrhythmias (repetitive forms) and LV dysfunction with subsequent mortality ***(Kjekshus, 1900)***. The presence of complex ventricular arrhythmias (especially non-sustained ventricular tachycardia) on ambulatory monitoring predicts total cardiac mortality. This observation suggests that the frequency and complexity of rhythm disturbances in patients with severe heart failure reflect

the severity of the underlying disease process rather than a specific arrhythmogenic state ***(Min-Soo, 2013)***.

However, many patients with DCM have well-compensated heart failure, with ventricular tachycardia (VT) being the dominant problem affecting quality of life. Improvements in pharmacologic and non-pharmacologic therapy for DCM continue to extend patient survival for this condition. As a consequence, the DCM population at risk for the development of VT will continue to increase ***(Deyell and Callans, 2011).***

Ambulatory ECG can be useful for symptom evaluation and risk stratification, especially in patients with a family history of SCD or frequent ventricular ectopy ***(Lakdawala et al., 2013)***.

The technology and techniques available for ventricular tachycardia (VT) ablation have grown considerably in recent years and, as a consequence, the success rates for catheter ablation of VT have also improved. Sustained, monomorphic VT is less common in DCM than among patients with ischemic heart disease ***(Deyell and Callans, 2011).*** Ablation of VT in DCM is challenging. The success rates have ranged between 50% and 70%, which is less than that reported for ischemic VT ***(Haqqani et al., 2011).*** However, ablation is frequently the only available therapy for patients who have failed antiarrhythmic therapy ***(Deyell and Callans, 2011).***

In some cases of frequent ventricular ectopy associated with LV dysfunction, catheter ablation or pharmacological therapy has been associated with reversal of cardiomyopathy, and the origin of the pathogenic premature ventricular contractions in these cases would be considered idiopathic rather than secondary to a myocardial process ***(Lakdawala et al., 2013)***.

Aim of the Work

The aim of the present study is to evaluate the utility of ventricular premature burden detected by ambulatory electrocardiographic monitoring (Holter ECG) in patients with dilated non ischemic cardiomyopathy for short term risk assessment of lethal ventricular arrhythmias.

Chapter One

INDICATION OF CARDIAC RESYNCHRONIZATION THERAPY IN DILATED CARDIOMYOPATHY

CRT is one of the most-successful therapies for heart failure to have emerged in the past few decades ***(Vernooy et al., 2014).***

In 1993, the cardiac surgeon Bakker et al. introduced biventricular pacing as a novel method to treat heart failure by synchronous stimulation of the right and left ventricle ***(Bakker et al., 2000).***

After this first-in-man implantation, the rapid development of trans-venous left ventricular (LV) leads and the implementation of biventricular pacing in implantable cardio-verter/defibrillators have established cardiac resynchronization therapy (CRT) as a standard treatment of heart failure with systolic LV dysfunction and broad QRS complexes ***(Meine et al., 2016).***

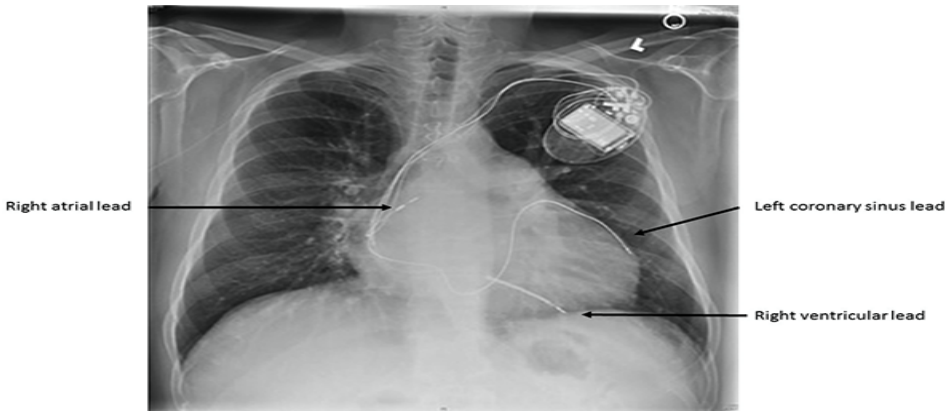

Figure (1): Cardiac resynchronization therapy ***(Murashita, 2017).***