Assessment of cardiac autonomic dysfunction after pulmonary vein isolation and its impact on success of paroxysmal atrial fibrillation ablation

Thesis

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List of Abbreviations

Abb.	Meaning
AAD	: Anti arrhythmic drug
ABP	: Arterial blood pressure
ACE	: Angiotensen converting enzyme
ACT	: Activated clotting time
AF	: Atrial Fibrillation
APD	: Action postential duration
ARB	: Angiotensen receptor blocker
ARIC	: Atherosclerosis risk in communities
ARP	: Atrial refractory period
ATR	: Atrial tachycardia remodeling
AVN	: Atrio-ventricular node
BB	: Beta blocker
BMI	: Body mass index
CAD	: Coronary artery disease
CB	: Cryoballoon
CCB	: Calcium channel blocker

List of Abbreviations

Abb.	Meaning
CCU	: Cardiac/Coronary care unit
CFAEs	: Complex fractionated atrial electrograms
CHF	: Congestive heart failure
CMAP	: Complex motor action potential
CS	: Coronary sinus
DC	: Direct current
EAM	: Electroanatomical mapping
ECG	: Electrocardiogram
EF	: Ejection fraction
EHRA	: European heart rhythm association
FAM	: Fast anatomical map
FMASU	: Faculty of medicine Ain Shams University
GA	: General anaesthesia
GAWAS	: Genome wide association studies
HF	: High frequency
HR	: Heart rate
HRS	: Heart rhythm society

List of Abbreviations

Abb.	Meaning
HRV	: Heart rate variability
ICE	: Intra-cardiac Echo
INR	: International normalized ratio
ITT	: Intention to treat
LA	: Left atrium
LAA	: Left atrial appendage
LAD	: Left atrial diameter
LAO	: Left anterior oblique
LF	: Low frequency
LIPV	: Left inferior pulmonary vein
LOE	: Level of evidence
LSPV	: Left superior pulmonary vein
LV	: Left ventricle
LVA	: Low voltage area
NOACs	: Novel oral anticoagulants
NR	: Non randomized
OH	: Orthostatic hypotension

List of Abbreviations

Abb.	Meaning
OITC	: Open irrigation tip catheter
PA	: Postero-anterior
PAF	: Paroxysmal AF
PA-HSR	: Post AF ablation high sinus rate
PV	: Pulmonary vein
PVI	: Pulmonary vein isolation
PVPs	: Pulmonary vein potentials
RAO	: Right anterior oblique
RF	: Rdiofrequency
RFCA	: Radiofrequency current ablation
RIPV	: Right inferior pulmonary vein
rMSSD	: Root mean square of differences between successive NN intervals
RSPV	: Right superior pulmonary vein
SAN	: Sino-atrial node
SDNN	: Standard deviation of NN intervals
SVC	: Superior vena cava

List of Abbreviations

Abb.	Meaning
TEE	: Transoesophageal Echo
TI	: Triangular index
TIA	: Transint ischemic attack
TOTPWR	: Total power
TSP	: Trans-septal puncture
ULF	: Ultra low frequency
VLF	: Very low frequency
WACA	: Wide area circumferential ablation

ABSTRACT

Background: Atrial-fibrillation is the most prevalent cardiac arrhythmia and a significant public health issue. Recently, radiofrequency current ablation and cryoballoon ablation are frequently used for rhythm control in symptomatic paroxysmal AF patients who are resistant to anti-arrhythmic drugs or even as a first-line rhythm control strategy. Several studies have demonstrated an increase in heart rate and a decrease in heart rate variability after radiofrequency catheter ablation of atrial fibrillation due to vagal denervation.

Aim of the work: to Assess the incidence and the value of post AF ablation cardiac autonomic dysfunction after Pulmonary vein isolation using radiofrequency and cryoballoon ablation techniques.

Patients and Methods: This study enrolled 40 patients who underwent paroxysmal AF ablation at Ain Shams University hospitals. Patients were randomized into 2 groups, Radiofrequency ablation guided by 3D mapping (RF group; n=20) and Cryoballoon ablation using 2nd generation balloons (CB group; n=20). Valid 24-hour Holter for heart rate variability analysis was done for each patient pre ablation, after 1 month, after 3 months and after 12 months. Statistical comparison between both groups regarding HRV changes and clinical outcome was done.

Results: The efficacy data in the form of freedom from AF at one year using radiofrequency technique was slightly higher than cryoballoon technique (75% Vs 65% respectively). However, this difference wasn't statistically significant (P-value 0.490). During the 3-point follow up of HRV parameters (month-1, month-3 and month-12), changes in time domain and frequency domain parameters persisted for 12 months after both techniques, being more pronounced in RF group than CB group. The change in HRV parameters was in favour of vagal withdrawal and sympathetic dominance (there was a Significant decrease in SDNN, rMSSD and triangular index, on the other hand there was a significant increase in LF/HF).

Conclusion: Cardiac autonomic dysfunction _assessed by Changes in time domain and frequency domain heart rate variability parameters_ persisted for 12 months after both techniques, being more pronounced in radiofrequency group than cryoballoon group.

Keywords: *ablation *arrhythmia *atrium *fibrillation *cardiac autonomic dysfunction *heart rate variability *cryoablation.