

**A Study of the Effect of IV Adenosine on the
Conduction of Accessory Pathway after
Radiofrequency Catheter Ablation**

Thesis

**Submitted for partial fulfillment of
Master Degree in Cardiology**

By

**HosamMohamad Abdel Basset Abdallah
M.B.B.CH-Ain Shams University**

Supervised by

Prof.Dr. /MervatAbou El-MaatyNabih

Professor of cardiology

Faculty of Medicine-Ain Shams University

Prof.Dr. /Sameh Emil Sadek

Consultant of Cardiology

Military Medical Academy

Dr. / Rania Samir Ahmed

Assistant professor of Cardiology

Faculty of Medicine-Ain Shams University

Faculty of Medicine

Ain Shams University

2013

INTRODUCTION

An accessory pathway has been recognized as a strand of (usually) working myocardial cells connecting atrial and ventricular myocardium across the electrically insulating fibrofatty tissues of the AV junction at anatomic sites intended by nature (that is remote from the locus of the bundle of his) **(Michael et al,1999).**

Successful ablation of accessory pathway is defined as ablation of antegrade and retrograde connection over the accessory pathway and tachycardia control without medication. Radiofrequency catheter ablation is now the procedure of choice for patients with a variety of tachycardia **(Brandao and Carrageta, 1999).**

Manifest accessory pathway, have antegrade and retrograde conduction properties. A concealed accessory pathway has the only retrograde conduction. After successful ablation of accessory pathway, detection of complete success is proved by loss of retrograde conduction via accessory pathway.

Adenosine triphosphate (ATP) is a naturally occurring compound that plays an important role in many biochemical processes. It inhibits calcium channels causing a decrease in the conduction velocity of the atrioventricular (AV) node. At sufficient dose this causes transient AV nodal block.

Electrophysiologists use the ability of adenosine to selectively block the AV node to reveal “hidden” accessory pathways. By blocking AV node conduction, adenosine can reveal accessory pathway conduction and can help confirm successful pathway ablation (**Mr Ian Wright, March 2007**)

AIM OF THE WORK

This study is a prospective study which will detect the role of IV adenosine in unmasking the conduction of the accessory pathway post radiofrequency catheter ablation.

PATIENTS AND METHODS

This study will include 30 patients with manifest or concealed accessory pathway who will undergo radiofrequency ablation of accessory pathway, in EL-MAADI ARMED FORCES HOSPITAL.

Intracardiac tracings will be analyzed using the computer or the real tracings. Localization of accessory pathways will be studied by analyzing the following:

- a. During sinus rhythm: The shortest AV signals recorded on coronary sinus 1.2, 3.4, 5.6, 7.8, 9.10, His bundle and right atrium.
- b. During orthodromictachycardia: The shortest VA during orthodromic tachycardia.
- c. During ventricular pacing: The shortest VA during pacing.

After ablation:

We will inject 6mg IV adenosine during atrial pacing to check the antegrade conduction of the accessory pathway and another 6mg of IV adenosine during ventricular pacing to check retrograde conduction of the accessory pathway.

The dose could be doubled to reveal any residual conduction of accessory pathway after ablation.

After using adenosine we will be able to detect any concealed accessory pathway that needs to be ablated to complete the successful ablation and prevent recurrence of tachycardia.

Statistical analysis:

The statistical analysis will be performed using the appropriate statistical method.

REFERENCES

- Brandoa L, Carrageta M. The therapeutic approach in refractory supraventriculartachycardias. Rev Port Cardiol,1999; 18 (3): 309-314.
- Michael Schluter, RiccardonCappato, FeifanAuyang Karl-Heinz Kuck. Ablation of anteroseptal and midseptal accessory pathways. In: Shoeik. StephenHaung: Radiofrequency catheter ablation of cardiac arrhythmias. Armond NY: Futura, 1999; pp.541.
- **Ian Wright,** Use of adenosine IN ELECTROPHYSIOLOGY. Coronary Heart, March 2007 edition 5.p33-35.

List of Content

Title	P.N
INTRODUCTION AND AIM OF THE WORK	1
Review of Literature	4
Adenosine	4
Pharmacology	5
Indications	6
Contraindications	7
Adverse effects	13
Dosage and administration	15
Over dosage	16
Accessory pathway: pathophysiology	17
Surface ECG localization	24
Electrophysiological testing	31
Radiofrequency catheter ablation of AP	32
Recurrence	36
Patients and methods	38
Results	53
Case study and examples	64
Discussion	77
Summary	81
Conclusion	84
Limitations	85
Recommendations	86

References	87
Appendix	98
Arabic summary	

List of Figures

Title	P.N
Fig. (1): chemical structure of adenosine.	4
Fig. (2): Mechanism of ORT & ART.	22
Fig. (3): Crude algorithm for accessory pathway localization by surface ECG	25
Fig. (4): Fine algorithm for localization of the AP.	26
Fig. (5): Different anatomical sites of AP	28
Fig. (6): Surface ECG showing manifest Left Lateral AP	29
Fig. (7): Surface ECG showing manifest RIGHT POSTERPSEPTAL AP.	30
Fig.(8): Surface ECG showing manifest posterpseptal AP.	39
Fig.(9): 12-lead ECG showing narrow complex SVT.	40
Fig.(10): 12 lead ECG showing wide complex tachycardia (Antidromic tachycardia).	40
Fig.(11): 12-lead ECG showing preexcited AF.	41
Fig.(12): showing GE Electrophysiology catheter system.	42
Fig.(13): showing quadripolar & decapolar catheters.	46
Fig.(14): LAO view showing ablation vatheter tip at CS 5,6 during ablation of left posteroior AP.	47
Fig.(15): Intracardiac tracing showing VA dissociation during V pacing post ablation.	49

Fig. (16): Ratio of preexcited ECG to normal ECG in males & females	54
Fig. (17): different types of manifest APs.	55
Fig. (18): ECG presentation during tachycardia.	56
Fig. (19): EPS localization of APs	58
Fig. (20): comparison between manifest & concealed APs	58
Fig. (21): Relation between 6mg & 12mg adenosine during atrial pacing.	60
Fig. (22): Resting 12-lead ECG showing manifest LP accessory pathway.	64
Fig. (23): Intracardiac tracing showing Preexcited AF	65
Fig. (24): intracardiac tracing showing site of successful ablation during atrial pacing from proximal CS at posteroseptal position (CS 9,10).	66
Fig. (25): 12-lead ECG showing loss of preexcitation during ablation.	67
Fig. (26): VA dissociation after adenosine 6mg during V pacing post ablation.	68
Fig (27): Intracardiac tracing showing 1:1 VA conduction through AVN post ablation.	69
Fig. (28): 12-lead ECG showing manifest left posterior AP.	70

Fig. (29): Intracardiac tracing showing 1:1 VA conduction after ablation via AVN.	71
Fig. (30): Intracardiac tracing showing AV dissociation after 6mg adenosine during atrial pacing.	72
Fig. (31): Intracardiac tracing showing VA dissociation after 6mg adenosine during ventricular pacing.	73
Fig. (32): 12-lead ECG showing narrow complex SVT at a heart rate of 150 b/m.	74
Fig.(33):Intracardiac tracing showing shortestVA recorded at CS 9,10 during ORT.	75
Fig. (34): Intracardiac tracing showing VA dissociation after 12mg adenosine during ventricular pacing post ablatio.	76

List of Tables

Title	P.N.
Table (1): Different types of accessory pathways.	19
Table (2): Clinical & demographic data.	53
Table (3): Frequency of patients with preexcited ECG & those with normal ECG.	55
Table (4): Electrophysiological based localization of APs among manifest & concealed APs.	57
Table (5) showing 6mg & 12mg adenosine effect during atrial pacing in manifest AP patients post ablation.	59
Table (6): 6mg adenosine effect during ventricular pacing after ablation success.	61
Table (7): 12mg effect in patients with no VA dissociation after 6mg adenosine.	62

LIST OF ABBREVIATIONS

AF	Atrial fibrillation.
AMP	Adenosine monophosphate
AP	Accessory pathway.
APD	Atrial premature depolarization
ART	Antidromic reentrant tachycardia
ATP	Adenosine triphosphate.
AV	Atrioventricular.
AVN	Atrioventricular node.
AVNRT	Atrioventricular node reentrant tachycardia.
AVRT	Atrioventricular reentrant tachycardia.
AS	Anterospetal.
C	Concealed.
CS	Coronary sinus
ECG	Electrocardiogram.
EPS	Electrophysiological study.
HB	His bundle.
HRA	High right atrium.
IU	International unit.
IV	Intra venous
LA	Left anterior.
LL	Left lateral.
LP	Left posterior.
LPS	Left posteroseptal.

M	Manifest.
MSEC	Milli seconds.
ORT	Orthodromic reentrant tachycardia.
PS	Posteroseptal.
RA	Right anterior.
RF	Radiofrequency.
RMS	Right midseptal.
RP	Right posterior.
RPS	Right posteroseptal
RVA	Right ventricular apex.
SR	Sinus rhythm.
SVT	Supraventricular tachycardia.
VA	Ventriculoatrial.
VPD	Ventricular premature depolarization.
WPW	Wolf-Parkinson-White.

ACKNOWLEDGEMENT

First and foremost, I thank **ALLAH** the most merciful and helpful.

Also, I wish to express my deep sincere feelings towards **Prof. Dr./ Mervat Abou El-Maaty Nabih**, Professor of Cardiology, Faculty of Medicine, Ain Shams University for her close supervision, advice guidance and encouragement and kindness. She kindly help me to have this work in its complete form.

I am lucky to be supervised and directed by **Prof .Dr. / Sameh Emil Sadek**, Professor of Cardiology, Military Medical Academy, for his moral support, guidance and encouragement in all of this work.

I am also very grateful to **Dr./ Rania Samer Ahmed**, Assisstant Professor of Cardiology, Ain Shams University, for her help support and encouragement throughout this work.

Finally I would like to thank **Dr./ KhaledShaheen** for his support and help throughout this work.

DEDICATION

To my family

To my beloved oneS

Without you, nothing is possible.