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CONTENTS

AVNRT Revisited: The Concept and Differential Diagnosis - AV Nodal versus Intra-atrial Reentry -

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Reentrant supraventricular tachycardia (SVT) has generally been classified into the following several types: (1) atrio-ventricular (AV) nodal reentrant SVT (AVNRT); (2) AV reentrant SVT (AVRT); (3) sino-atrial nodal reentrant SVT (SANRT); and (4) intra-atrial reentrant SVT (IART). When the diagnosis of AVRT and SANRT is excluded, we often encounter the difficulty to make a distinction between fast-slow AVNRT (anterior type[1], Figure 1) versus IART near the AV node at the His bundle recording site (i.e., adenosine-sensitive IART). This is because in the latter 2 SVTs the earliest atrial activation during SVT commonly occurs at the same site (AV nodal area at the His bundle recording site). Although several diagnostic criteria have been proposed for the correct diagnosis of AVNRT or adenosine-sensitive IART, those criteria are still unsatisfactory.

1. Reentry Circuit of AVNRT and Adenosine-sensitive IART

According to the textbook of clinical cardiac electrophysiology, IART is defined only when all parts of the entire SVT circuit comprise atrial musculatures without involvements of the sino-atrial nodal or AV nodal cells[2]. However, the original article by Iesaka et al. described that adenosine-sensitive IART would probably be due to focal reentry within the AV node or its transitional tissues without involvement of the AV nodal (conducting) pathways[3]. This seemed to suggest that part of the mechanisms of adenosine-sensitive IART would be due to atrio-AV nodal reentry. In contrast, most EP investigators understand that the tachycardia circuit of AVNRT includes slow and fast AV nodal pathways and also peri-AV nodal transitional tissues (i.e., atrio-AV nodal reentry). Thus, it may be possible that both SVT mechanisms would be the same, that is, atrio-AV nodal reentry. If this is true, it might be theoretically impossible to distinguish long RP type SVT between adenosine-sensitive IART versus AVNRT.

2. Requirements for Reentry: Electrophysiologic Considerations

Electrophysiologically, the following 3 conditions are indispensable for the initiation of reentry: (1) the presence of a reentry circuit (dual pathways); (2) unidirectional block in one of the dual pathways and (3) slow conduction through the unblocked pathway. Therefore, when electrical stimulation of the heart does not induce unidirectional block and/or slow conduction, reentrant SVT cannot be

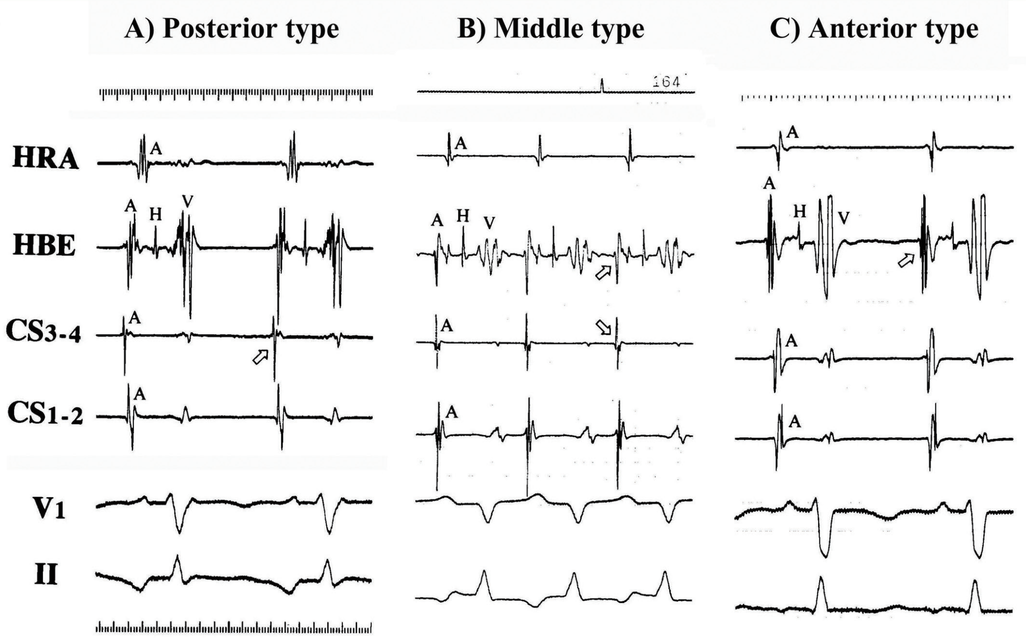

Figure 1. Typical tracings of intra-cardiac electrograms of three types of fast–slow AVNRT
In the anterior type AVNRT, earliest atrial activation is registered at the His bundle recording site.

initiated. This point, however, has not been well studied in the differentiation between AVNRT versus adenosine-sensitive IART near the AV node. Josephson[2] suggested that intra-atrial conduction delay (IACD) is mandatory for the initiation of IART. Because the effective refractory period of the atrial musculature is generally 200msec to 300msec, IACD is generally seen at the coupling intervals of < 300msec during atrial extrastimulus testing, or at the paced cycle length of < 300msec with rapid atrial pacing. Thus, it might be rational to presume that initiation of IART is possible only at coupling intervals of < 300msec, or by rapid atrial pacing at a paced cycle length of < 300msec. In contrast, when long RP tachycardia is induced by rapid atrial pacing at a paced cycle length of >350msec, the diagnosis of AVNRT will be more likely. Typical example of induction of fast-slow AVNRT is shown in Figure 2. In an attempt to induce SVT, an atrial extrastimulus was given at S1S2 interval of 750msec after the S1S1 drive of 800msec. Unexpectedly, SVT was provoked after the last S1 stimulus (before the S2 stimulus at 750ms); this mode of SVT induction by low-rate atrial pacing (at 800msec) demonstrated that the tachycardia was provoked in the absence of IACD. The absence of IACD during SVT induction strongly suggested that the tachycardia mechanism was not due to intra-atrial reentry[2].

3. SVT Induction by Ventricular Stimulation

SVT induction by ventricular stimulation has not been adequately analyzed in the differentiation between adenosine-sensitive IART (or SANRT) versus AVNRT. Examples of SANRT and AVNRT induction are shown in Figures 3 and 4, respectively. Figure 3 shows induction of SANRT by ventricular extrastimulation. Although SANRT and IART are different SVTs, modes of SVT induction by ventricular stimulation would be the same between SANRT versus adenosine-sensitive IART (i.e., “V-A-A-V” sequence). In Figures 3A and 3B, V2 extrastimuli were delivered at S1S2 intervals of 540msec and 520msec after 8 beats of basic S1 drive at 600msec. In Figures 3A, both V1 and V2 impulses conducted retrogradely to the atrium by way of the AV node, and generated A1 and A2 responses with an A1A2 interval of 540msec, indicating absence of additional conduction delay via the AV node. In Figure 3B, while S1S2 interval was shortened to 520msec, A1A2 interval was shortened to 530msec (not 520msec). This is because S2 impulse conducted to the atrium with an additional conduction delay by 10msec. Despite the small additional conduction delay, A1A2 interval was critically shortened to the 530msec value, arousing induction of SANRT with “V2-A2-Ae1-Ve1” sequence. The fact that critically shortened A1A2 coupling interval was necessitated for SVT induction is consistent with the notion that the SVT mechanism in Figure 3 is sino-atrial nodal or intra-atrial reentry.

In contrast with sino-atrial nodal reentry, Figure 4 shows induction of fast-slow AVNRT by ventricular extrastimulation with the demonstration of “V-A-V” sequence, which excluded IART. In Figures 4A and 4B, V2 extrastimuli were delivered at S1S2 intervals of 610msec and 600msec after 8 beats of basic S1 drive at 800msec. In Figures 4A, both V1 and V2

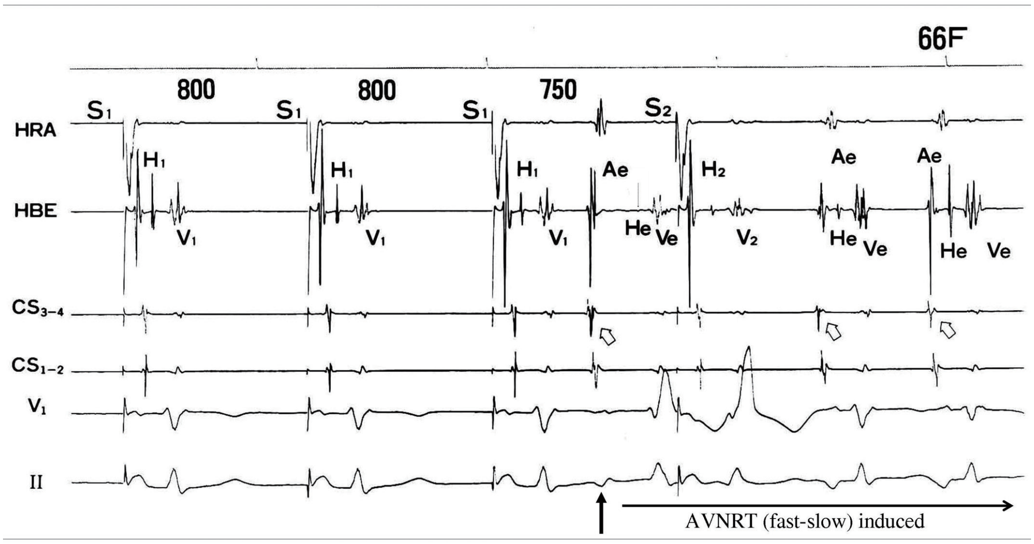

Figure 2. Induction of fast-slow AVNRT without IACD (intra-atrial conduction delay)
Fast-slow AVNRT (Ae, He, Ve) was provoked after the 3rd S1 stimulus. SVT induction by low-rate atrial pacing (800msec) indicates that the tachycardia was provoked in the absence of IACD.

impulses conducted retrogradely to the atrium by way of anterior AV nodal pathway, and generated A1 and A2 responses with an A1A2 interval of 720msec (CS3-4 tracing), indicating retrograde decremental conduction via the AV node.

Figure 4B shows induction of fast-slow AVNRT by ventricular stimulation with “V-A-V” sequence. In Figure 4B, S1S2 interval was shortened to 600msec but A1A2 interval was lengthened to 750msec (on CS3-4 tracing) due to further conduction delay over the posterior AV nodal pathway. The fact that SVT induction did not require shortening of the A1A2 interval suggested that the SVT mechanism in Figure 4 is not intra-atrial reentry, thus confirming AVNRT with the demonstration of “V2-A2-Ve1” sequence.

4. Exclusion Criteria to Rule Out Intra-atrial or AV Nodal Reentry

We often encounter the difficulty to make a distinction between anterior type fast-slow AVNRT (Figure 1) versus adenosine-sensitive IART near the AV node. When the diagnostic criteria of IART are examined in detail, there seems to be no perfect diagnostic criteria that can completely exclude AV nodal reentry, thus making it impossible to confirm the diagnosis of IART. In contrast, two exclusion criteria have been shown to definitively exclude IART, enabling us to confirm the diagnosis of AVNRT. The two exclusion criteria are as follows: (1) IART can be entirely excluded if the SVT is induced by ventricular stimulation with the “V-A-V” sequence (Figure 4B), and (2) IART can be entirely excluded if the SVT is terminated by ventricular stimulation without conduction to the atrium (Figure 5B, SVT termination due to VA block). In Figure 5, programmed ventricular stimulations (PVS) are given at coupling intervals of 310msec(5A) and 300msec(5B) during sustained SVT with a stable cycle length of 510-515msec. In Figure 5A, a single PVS reset the SVT with a slight prolongation of atrial cycle length to 520msec (atrial capture with paradoxical delay). In Figure 5B, a single PVS delivered 10msec earlier terminated the SVT without conduction to the atrium, thus ruling out intra-atrial reentry.

5. “V-A-A-V” sequence does not exclude AVNRT

It has been demonstrated in the previous study[4] that “V-A-A-V” response after entrainment pacing or induction of SVT by ventricular stimulation excludes the diagnosis of AVNRT, thus confirming IART, but this may not be always true. Figure 6 shows an example of “V-A-A-V” response by ventricular overdrive pacing in a patient with slow-fast AVNRT. In Figure 6, 15 beats of rapid ventricular stimulation were delivered in sinus rhythm at a paced cycle length of 440msec (6A) and 430msec (6B). In Figure 6A, 1:1 stable VA conduction through the fast AV nodal pathway was seen. In Figure 6B, however, termination of rapid ventricular pacing at a cycle length of 430msec was followed, unexpectedly, by 2 atrial (A15, A15’) and one ventricular (Ve) electrograms with “V15-A15-A15’-Ve” sequence. Occurrence of the A15 and A15’ electrograms (A15A15’= 335msec) may be explained in 2 ways, that is, intra-atrial reentry, or double atrial response due to concurrent conduction by way of retrograde dual AV nodal pathways. Although it may be possible that rapid atrial pacing (caused by 1:1 VA

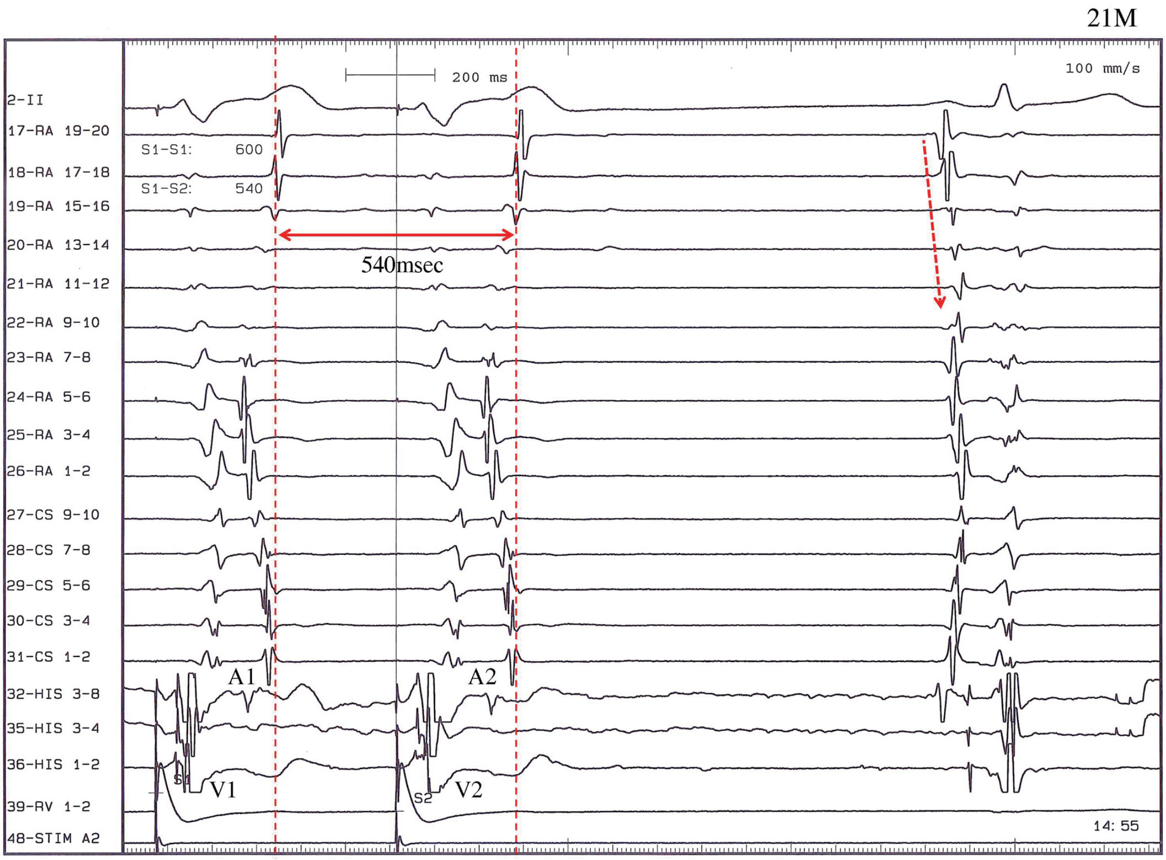

Figure 3. *Induction of SANRT by ventricular stimulation*

Figure 3A: *Ventricular extrastimulation at S1S2 interval of 540msec (S1S1= 600msec).*

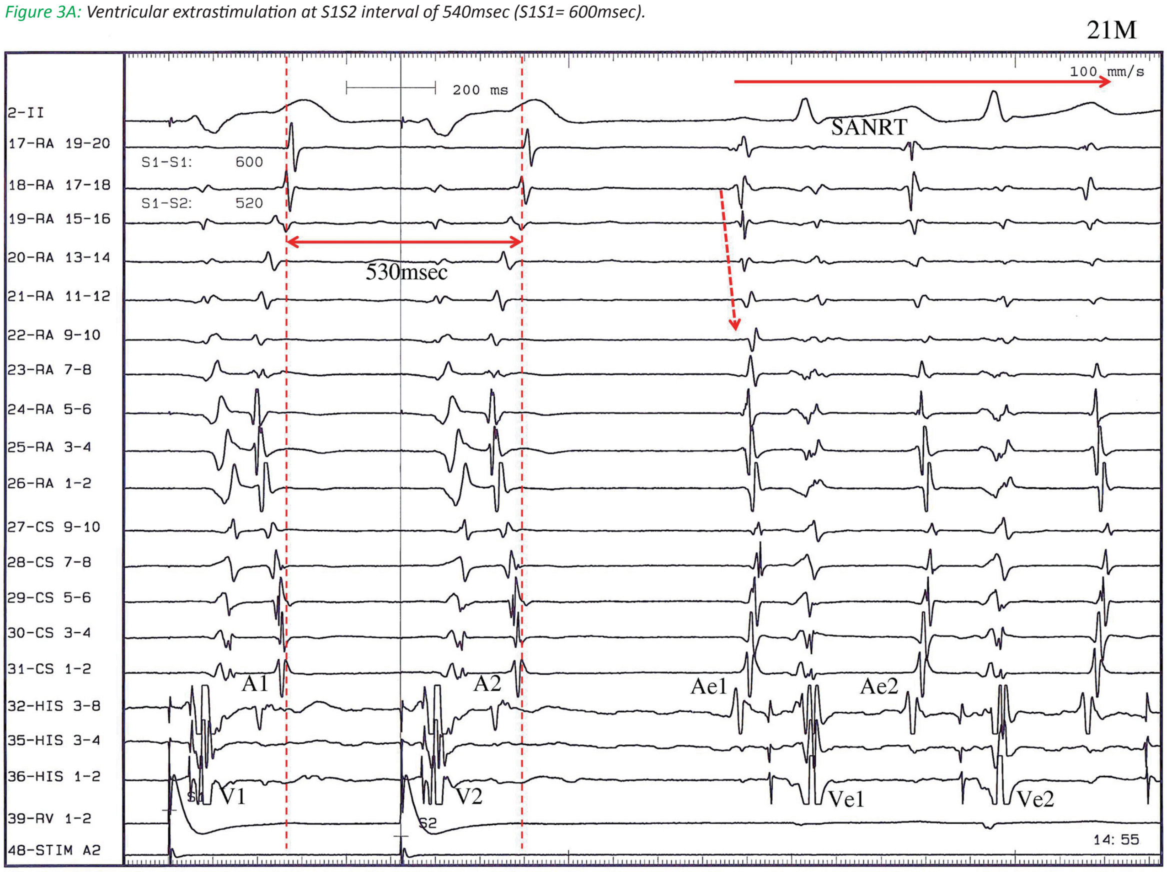

Figure 3B: *Ventricular extrastimulation at S1S2 interval of 520msec (S1S1= 600msec).*
SANRT was induced because A1A2 interval was shortened to 530msec.

conduction) provoked A15' electrogram by the mechanism of intra-atrial reentry, concurrent conduction over retrograde dual AV nodal pathways (i.e., double atrial response) will be more likely, since the occurrence of A15' electrogram was observed in a patient with slow-fast AVNRT as well as retrograde dual AV nodal pathways. Furthermore, occurrence of IACD, which is prerequisite for intra-atrial reentry, would be unlikely at the atrial cycle length of 430msec (Figure 6B), since IACD commonly occurs at the atrial paced cycle length of <300msec. Absence of IACD during induction of a single Ve beat in this patient strongly suggests that A15' electrogram was not due to atrial reentry[2]. Thus, the finding in Figure 6B seems to support the notion that SVT induction by ventricular stimulation with the demonstration of "V-A-A-V" sequence is not always an electrophysiologic evidence of IART[5].

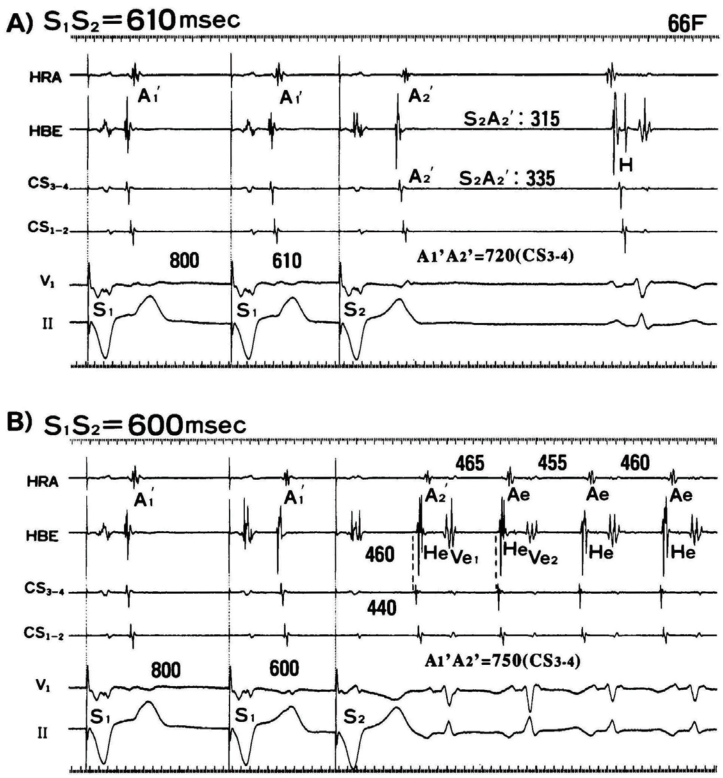

Figure 4. Induction of fast-slow AVNRT by ventricular stimulation

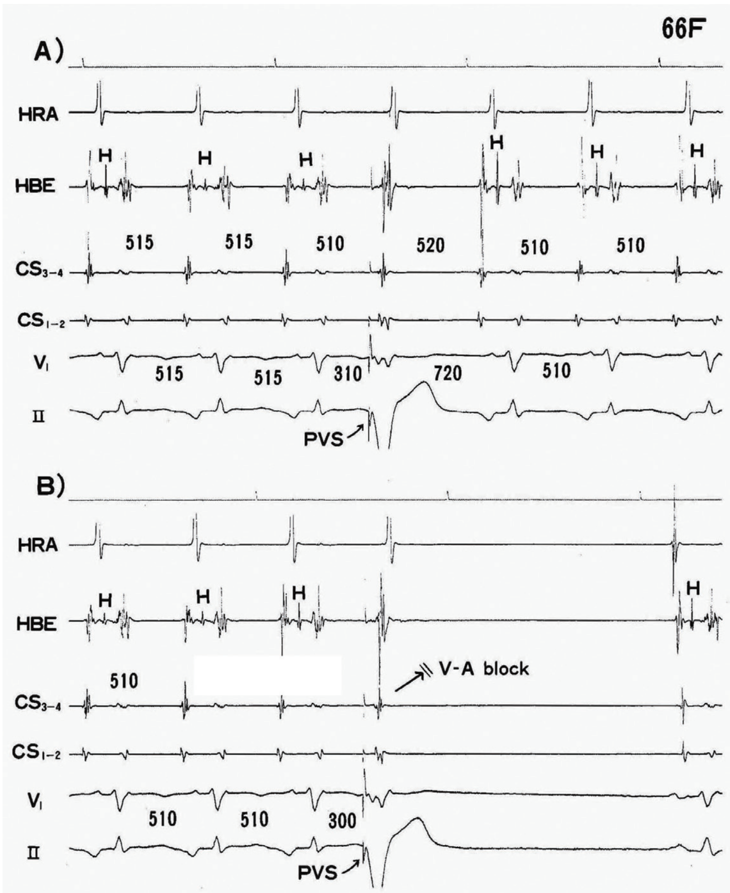

Figure 5. Programmed ventricular stimulation (PVS) during fast-slow AVNRT PVS are delivered at coupling intervals of 310msec (A) and 300msec (B).

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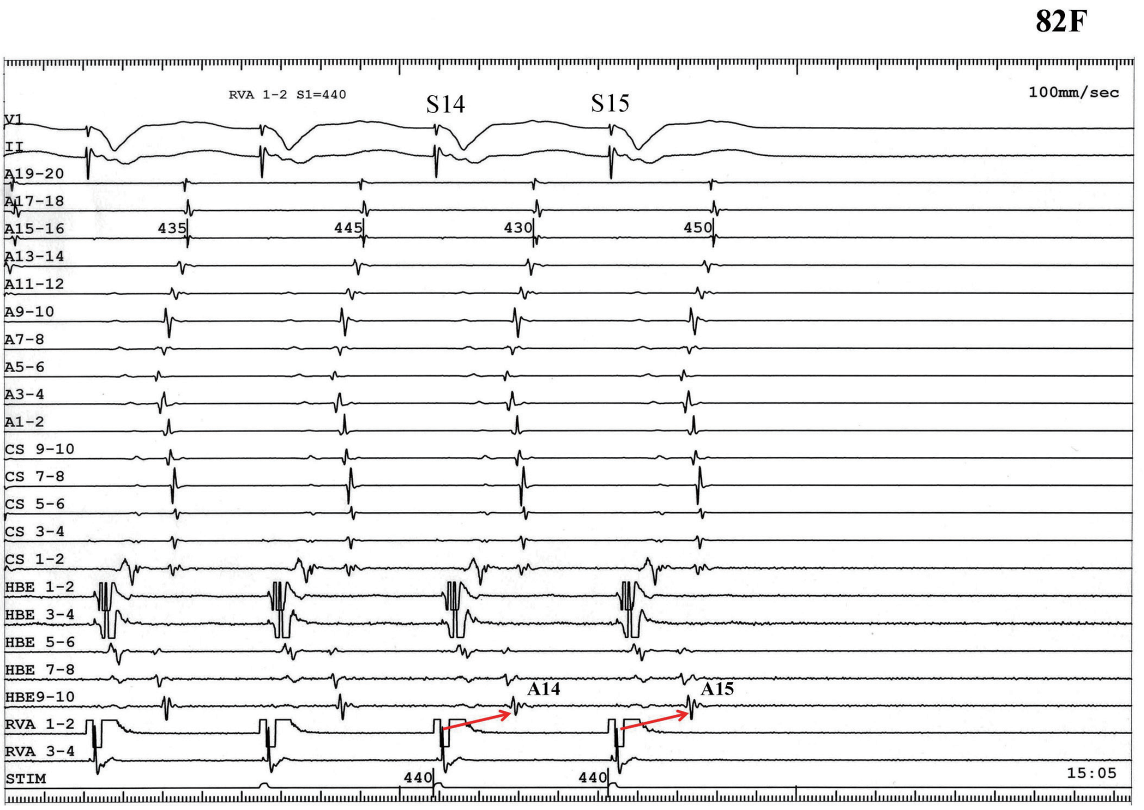

Figure 6. *"V-A-A-V" response by ventricular stimulation in a patient with slow-fast AVNRT*
Figure 6A: *Rapid ventricular pacing at a cycle length of 440msec*

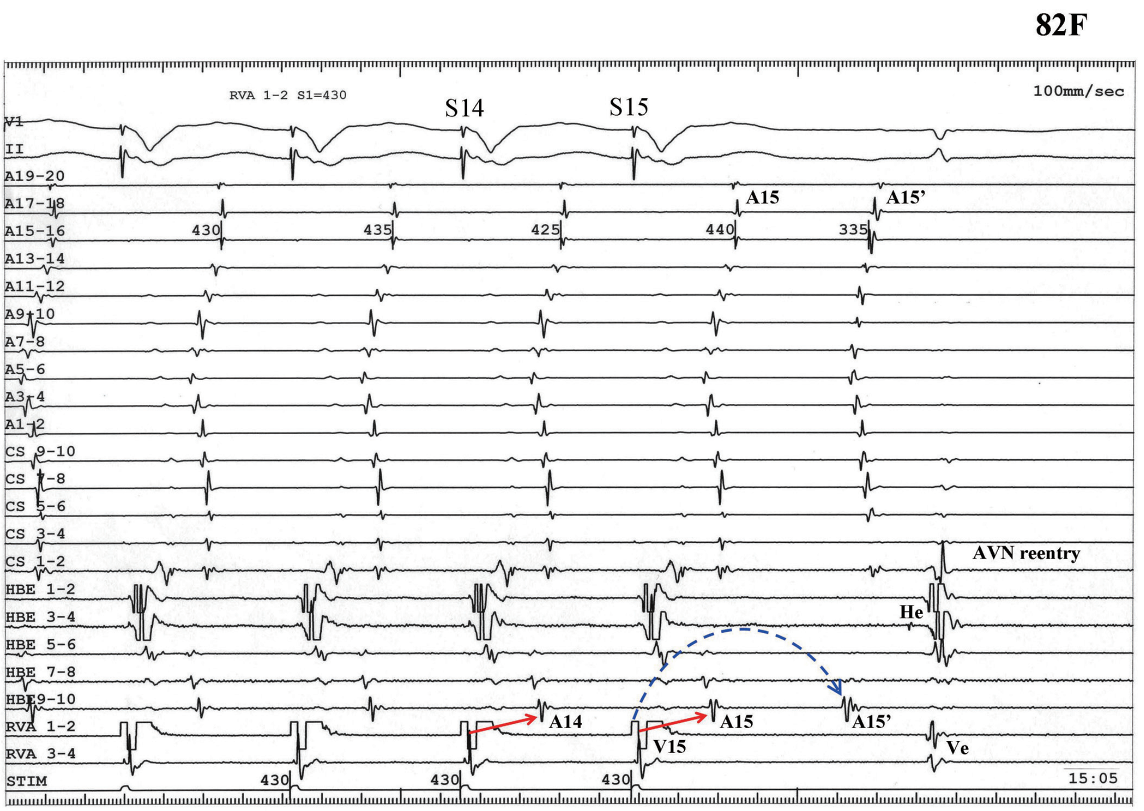

Figure 6B: *Rapid ventricular pacing at a cycle length of 430msec*
A single AV nodal reentry was provoked with V15-A15-A15'-Ve sequence.

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Report of the 29th JHRS Annual Meeting

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The Japanese Heart Rhythm Society held its 29th Annual Meeting from July 22 to 25, 2014, at the Prince Park Tower Tokyo, in conjunction with the 31st Annual Scientific Meeting of the Japanese Society of Electrocardiology (President Prof. Hirotsugu Atarashi). By combining the conferences held by Japan's two leading arrhythmia societies, we were able to provide a broader range of sessions, spanning from basic medicine to the latest clinical medicine, on the subject of cardiac electrophysiology and electropharmacology, state-of-the-art technologies and new device treatments, and surgery.

It has been 110 years since Einthoven recorded his surface electrocardiogram and 45 years since the recording of His bundle potential by Scherlag, et al. The fields of arrhythmia and electrophysiology have advanced significantly since that time. The mechanisms of refractory arrhythmias such as atrial and ventricular fibrillation are still insufficiently understood, however, and methods of treating them yet to be established. While pacemaker and ICD implantation may work as alternative or bail-out procedures, they do not offer a full cure. In order to address the problems that still require a solution, we need to reexamine the knowledge and techniques we have developed and ensure that we pass on our legacy to those who come after us. Therefore, we proposed "Learning the Legacy and Confronting the Future" as the theme for our joint meeting.

In the field of arrhythmia there are a broad range of subjects that we need to address. These include molecular biology, electrophysiology, catheter/device therapy modalities, and surgical techniques. Not only we do need to train the next generation of residents and young doctors, we also need to reach our medical students. We therefore placed a strong emphasis on education during the meeting and, rather than only pursuing the latest cutting-edge areas, we focused on basic issues that still require solutions.

In the scientific sessions, we had a total of 3,738 participants, comprising medical doctors and scientist, nurses, clinical engineers, residents, and medical students. A variety of sessions, including 22 symposia, 12 panel discussions, special lectures, invited lectures, educational lectures, oral and poster sessions, were held, and cutting-edge presentation and fruitful discussions were performed regarding the mechanism, diagnosis, and therapies of every field of cardiac arrhythmia. A total of 32 guest speakers from aboard were invited and gave lectures. In addition to the joint session with the APHRS, the Heart Rhythm Society and the European Heart Rhythm Association, a number of English sessions were prepared and all the abstracts for the presentation by medical doctors and scientists were prepared in English in order to facilitate lively discussions involving participants from abroad.

JHRS Scientific Sessions had 3,738 participants

We also placed great importance on team-based medical care involving allied professionals, believing that without close cooperation with them it is impossible to provide high-quality medical treatments to patients in a safe and appropriate manner. Thus, in this congress, we offered improved programs designed to help all the medical staff members work effectively as a "heart team."

Young Investigator Award (YIA) has become the most exciting award for young doctors in most congresses. The YIA in JHRS 2014 was given to Dr. Kohei Ishibashi in National Cerebral and Cardiovascular Center, Osaka, Japan, for his excellent presentation of “Safety and Efficacy of β-blocker Therapy for Pregnant Woman and Baby in the Congenital Long-QT Syndrome”.

New in the program this year was the sweets sessions in the afternoon, providing heart-shaped macarons made by Jean-Paul Hévin, a popular and talented chocolatier. Every evening after the scientific sessions, draft beer was provided free of charge at the exhibition hall, hoping the attendances refresh their throat and feeling.

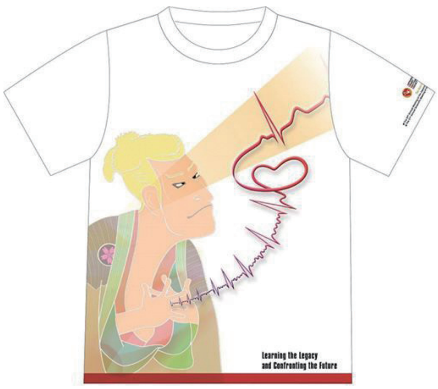
Heart-shaped macarons served at the “Sweets Sessions”

Participants enjoy cold draft beer at the exhibition hall

We adopted a unique logo of popish Kabuki actor and used it in posters, flyers, web pages, stationeries, and others. T-shirts with the logo were prepared and sold for participants. All the proceeds from the sales of the T-shirts were donated to Doctors Without Borders.

Invited Kabuki actor (center) gathered with physicians attended at the reception

JHRS 2015 next year will be held in Kyoto by the President Dr. Kazuo Matsumoto, in conjunction with the 32nd JSE (President Prof. Yoichi Kobayashi). We all are excited and looking forward to welcoming many participants from Asia-Pacific region to the JHRS 2015 in Kyoto.



The proceeds from the sales of the T-shirts were donated to Doctors Without Borders

EP Image: "Unicorn-Shaped" Left Atrium: Triggers Originating from Remnant Left Pulmonary Vein in a Patient with Paroxysmal Atrial Fibrillation

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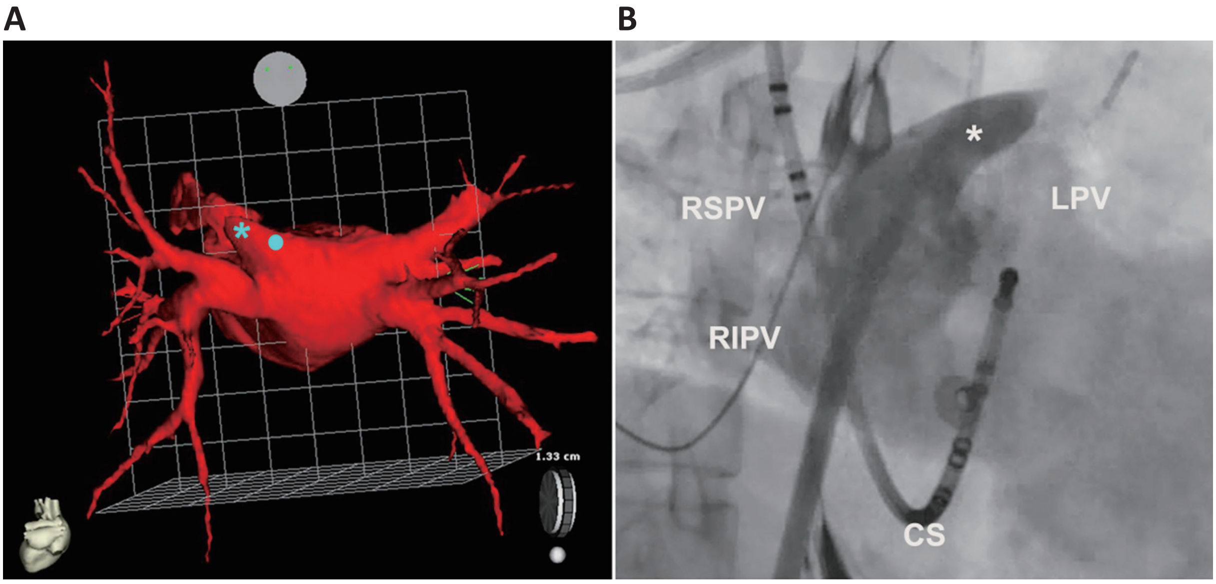
A 52-year-old woman's medical history was otherwise notable only for diabetes mellitus. She was admitted for catheter ablation for drug-refractory paroxysmal atrial fibrillation (AF). Pre-procedural left atrium geometry (Figure 1-A), reconstructed from CT scan by using CARTO® 3 system (Biosense-Webster, Diamond Bar, CA, USA), depicted congenital abnormality with left common ostium from left inferior pulmonary vein (PV) and a remnant left superior PVs. Compatible with left atrium angiography (Figure 1-B), a "unicorn-shaped" left atrium with atresia of left superior PV was shown (from *). Spontaneous triggers from the roof of remnant left superior PV were recorded (from ●). Circumferential isolation of the remnant PV by catheter ablation terminated AF, and the procedure was followed by circumferential isolation of other PVs. No other atrial arrhythmias were inducible with programmed atrial stimulation thereafter.



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ECG Quiz

The model commentary will be provided in the next issue No.17

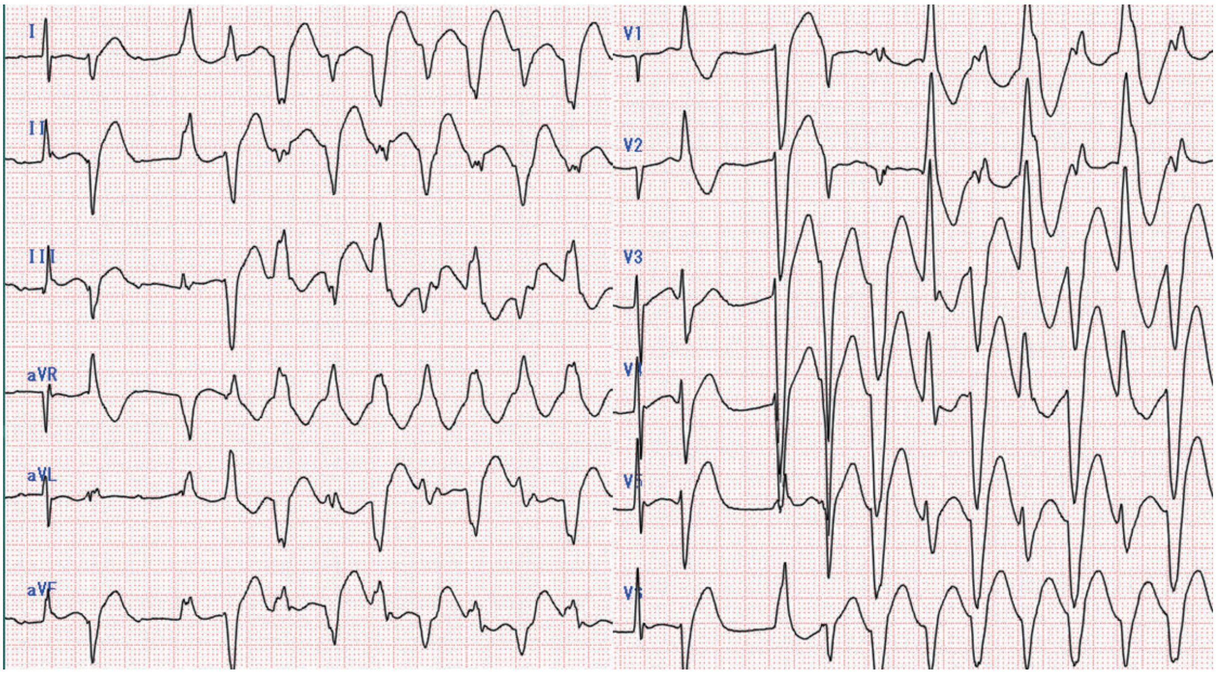
Masayasu Hiraoka, MD, PhD, FHRS

A 43-year old man was transferred to the hospital by an ambulance because of severe nausea, vomiting and restlessness. He was drowsy but could respond to questionnaires. He had no past history of syncope and no family history of sudden cardiac death.

He had spent a normal daily life without any physical distress until the day before admission and he suddenly developed symptoms next morning. ECG was taken at the emergency room. What was the diagnosis and cause of this arrhythmia? Select correct answers.

[A]. What is a correct diagnosis of this ECG?
 (1) Multifocal premature ventricular contractions (PVCs)
 (2) Polymorphic ventricular tachycardia (VT)
 (3) Bidirectional VT
 (4) Torsades de Pointes (Tdp)
 (5) Ventricular fibrillation (VF)

[B]. What is the most probable cause of this arrhythmia?
 (6) Catecholaminergic polymorphic ventricular tachycardia (CPVT)
 (7) Andersen-Tawil syndrome (ATS)
 (8) Digitalis intoxication
 (9) Aconitine intoxication
 (10) Severe hypokalemia



Beijing Anzhen Hospital, Capital Medical University

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General Introduction

Beijing Anzhen Hospital of Capital Medical University was founded in April 1984 by the founder of Thoracic and Cardiovascular Surgery academician Prof. Wu Ying Kai. The medical institute is composed of medical treatment, teaching, research, prevention, and international exchanges. Beijing Anzhen Hospital is the sixth affiliated hospital of the Capital Medical University. In 1994 it was named among the International WHO & UNICEF Baby Friendly Hospital Initiative, and was one of the twenty-ninth Olympic Games designated hospitals in 2008.

Hospital covers an area of 76,500 square meters, medical area of 205,500 square meters. With fixed assets of 1.7 billion CNY and an annual income of 30 billion CNY, the hospital has more than 4,000 staff, including over 600 senior professional and technical personnel. Additional to that, there are 6 clinical centers, 30 clinical departments, 11 medical departments and 1,500 beds. To facilitate procedures, there are 30 laminar flow operating room (including hybrid), 13 catheterization laboratories (including magnetic navigation), 83 postoperative beds. All the medical equipments are as per international standards which creates the best environment for patients.

Department of Cardiology of Anzhen Hospital is a national key discipline, while Cardiac and Vascular surgery is a Beijing City Municipality key discipline. Department of Cardiology, Cardiac and Vascular surgery, and Geriatrics are national key clinical specialties, which have formed the core of Cardiology in China. Anzhen Hospital is currently the national clinical research center of cardiovascular disease endorsed by the Ministry of Education, Ministry of Health and Ministry of Science and Technology.

Over 2 million patients are seen at the outpatient clinic and almost 20,000 surgeries including 10,000 cardiac and 4,000 coronary artery bypass grafting. Being ranked the first in general hospital, last year the department of Cardiology performed 20,000 coronary angiograms and 10,000 coronary interventions. Over the years, heart, lung and combined heart and lung transplantation have been performed at Anzhen Hospital and was one of the first appointed centers for organ transplantation in China. The hospital provides treatment, education and research facilities making it a major center in the management and training of cardiac and pulmonary diseases.

In the new era, the entire staff continues to adhere to the "public, diligence, strict and honesty" principals which will contribute towards achieving first-class medical care, first-class team and first class management.

Cardiology Center

The Cardiology Center is one of the largest national centers treating severe and tough cases. It is the national training and continuous medical education center for cardiovascular diseases with highly specialized personnel and state-of-the-art medical facilities. In 2007 the Ministry of Education approved it the national key discipline and in 2011 became one of the centers of the Ministry of Health national clinical specialties. It the training center for Cardiovascular Interventions (coronary heart disease, congenital heart disease, cardiac arrhythmia intervention). Cardiology center has more than 400 beds, 13 catheterization laboratories including one room equipped with magnetic navigation system and one hybrid operating theater.

Cardiac Surgery Center

Cardiac Surgery Center has more than 350 beds, 8 wards and 17 operating theaters. It is ranked the first general hospital in the number of annual cases performed. Among the procedures performed include coronary artery by-pass grafting, valvular surgery, aortic surgery, congenital heart disease and heart transplantation. The center is undertaking a number of national and provincial research projects in the field of cardiac diseases. Some of the previous findings have been published in international journals. Additional to that, the center also trains the next generation of cardiac surgeons.

Pediatric Heart Center

Beijing Pediatric Heart Center is the largest children's heart center in general hospitals. The 124 bed-center with highly specialized experts has an intensive care unit, cardiac ultrasound and function test unit and has performed 3500 pediatric heart procedures. The center is renowned locally and internationally for treatment, education and research. The center also is undertaking national and provincial research projects.

Anesthesia Center

It was previously known as Department of Anesthesia of Beijing Anzhen Hospital and founded in 1984. In 1999, pain management department was established and in 2004 a post-anesthesia recovery room was opened. In April 2013, the Center for Anesthesia was established with 207 staff including 8 chief physicians, 15 deputy chief physicians (4 professors and 1 associated professor), 1 doctorate supervisor, 4 masters student supervisor and 60% of the doctors hold postgraduate degrees. The center has 28 operating rooms and each operating room has an independent anesthesia and monitoring machine. The Center is also a national phase II clinical trial center and a training center for anesthetists.

Emergency Critical Care Center

The 120-bed Emergency critical care center was established in 2000 with emergency unit, observation unit and emergency intensive care unit. The 5000 meter squared center incorporates clinical laboratory, pharmacy, ultrasound, CT and MRI. It is the largest emergency center with expertise in cardiac and pulmonary emergencies in China. With sophisticated facilities, the center manages acute coronary syndromes, pulmonary emboli, aortic dissection, respiratory failures and multiple organ failure. Additional to that, the leading center in China has a chest pain unit with 24/7 service.

Cardiac Surgery Critical Care Center

It is one of the main departments of the hospital, with state of the art facilities. It is mainly responsible of periprocedural management of cardiac surgery patients. It combines treatment, education and research. The 70-bed center is made up of critical care unit, cardiopulmonary bypass unit and mechanical circulatory support units. The center can support all kinds of cardiac surgeries with deep hypothermic circulatory arrest with combined selective cerebral perfusion, low birth weight infants undergoing cardiopulmonary bypass, mini-cardiopulmonary bypass, cancer hot therapy and other complex technologies. The center is staffed with 45 doctors including 7 chief physicians, 14 deputy chief physicians, 25 resident doctors, and 256 nurses. Apart from cardiopulmonary bypass, the center also uses intra-aortic balloon, ECMO and LVAD and renal replacement therapy.

Research Profile

Research has always been an important aspect of the hospital as we advance in creating an institutional hospital. The hospital promotes research and creates platform for different aspects of research like translational medicine, which in return will support hospital development.

Beijing Anzhen Hospital has set up a Science and Technology Association, academician expert workstation, Ministry of International Science and Technology Cooperation Base, and the Beijing

National Library of cardiovascular disease in clinical samples, Beijing Cardiovascular Disease Clinical Research Center, Department of Education Innovation Team, National Cardiovascular Innovation drug development technology platforms, Engineering Center of Ministry of Education, Ministry of Education Key Laboratory, national Research Center for Cardiovascular Disease Clinical Medicine. Currently the hospital is running more than 200 research projects supported by the State, the City with total funding of 100 million CNY. In the last decade, more than 600 SCI papers were published and almost 5000 other publications were made.

Education

As the sixth affiliated hospital of Capital Medical University, we undertake teaching in clinical medicine, preventive medicine, pharmacy, dental, laboratory, biomedical engineering, nursing and other professional clinical teaching. The hospital has 11 postdoctoral stations, 11 doctoral training point 11, 19 Master-degree training points. It is a center for standardized specialist training, and hold national, municipal and district level continuing medical education programs each year. As one of the country's' physician practice skills exam base, 500 candidates are examined per year. Sino-French Medical Emergency Training Center, Capital Medical University Clinical Skills Training Center, the Ministry of Health endoscopic expertise general surgery, gynecology training base, Capital Medical University, Department of Cardiac Surgery, Department of Cardiology training of all kinds are held.

International Exchange

Since the establishment of the International Exchange Center in 1985, the hospital has been focusing on international exchange by interacting with internationally renowned experts in latest medical technology, participating in international conferences hosting international academic conference and seminars, like hosting Five-Continent International Conference on Cardiovascular Disease We have received experts from over 30 countries like USA, Britain, France, Italy, Japan etc. Additional to that, our doctors have gone to other countries for exchange programs to learn to improve the level of medical expertise.

Social Welfare

The carrying the social responsibility and answering the national call, the hospital has selected outstanding medical teams which were sent as aid to Guinea. The teams performed their duties very well during their stay. Locally, renowned experts from our hospital have been sent to Tibet, Xinjiang, Qinghai, Sichuan and other places to carry our aid work. Other programs which were highly regarded by the government involved treating children with congenital heart disease from Tibet and Xinjiang.

Additional to that, the hospital has been supporting educational programs through different forms of media to promote public awareness of disease and healthy practices like taking part in CCTV, Beijing TV, and periodically arranged talks at the hospital. In every season, free educational health materials are given for free to the public.

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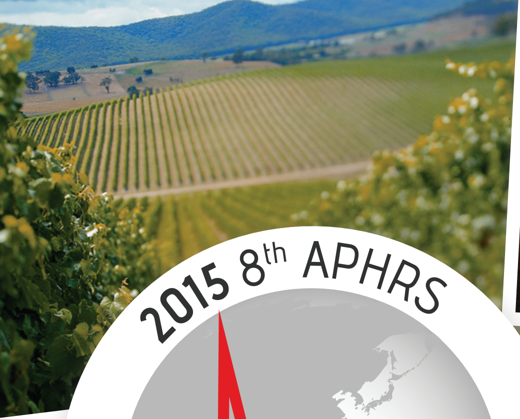

ECG Commentary Related to the Quiz in the No. 15 Issue

Meiso Hayashi, MD

Department of Cardiovascular Medicine, Nippon Medical School

Commentary:

A1. 3) Respiratoin

A2. 4) Catheter ablation

The twelve-lead electrocardiogram (ECG) shows incessant irregular atrial tachycardias with cycle lengths ranging from 210 to 280 ms. A simultaneous recording of the ECG and respiratory monitor demonstrates that the tachycardia develops after starting the inspiration and ceases during the following expiration, which indicate that this tachycardia is a respiratory cycle–dependent atrial tachycardia (RCAT) (Figure 2). The detailed characteristics of RCATs were reported in 2011,[1] and were as follows: 1) the P-wave morphology in the ECG was positive or had a positive-to-negative biphasic pattern in V1, and was positive in leads I and II, 2) the tachycardia was refractory to class I antiarrhythmic drugs and beta-blockers, 3) radiofrequency catheter ablation, targeting or isolating the tachycardia origin locating at the antrum of the right superior pulmonary vein (RSPV), inside the RSPV, or inside the superior vena cava, successfully eliminated all RCATs and was considered to be the most optimal therapeutic strategy. In this patient, the tachycardia was completely abolished by a radiofrequency energy delivery on the septal side of the RSPV antrum.

Reference

1. Yamamoto T, Hayashi M, et al. Heart Rhythm 2011; 8:1615-1621.

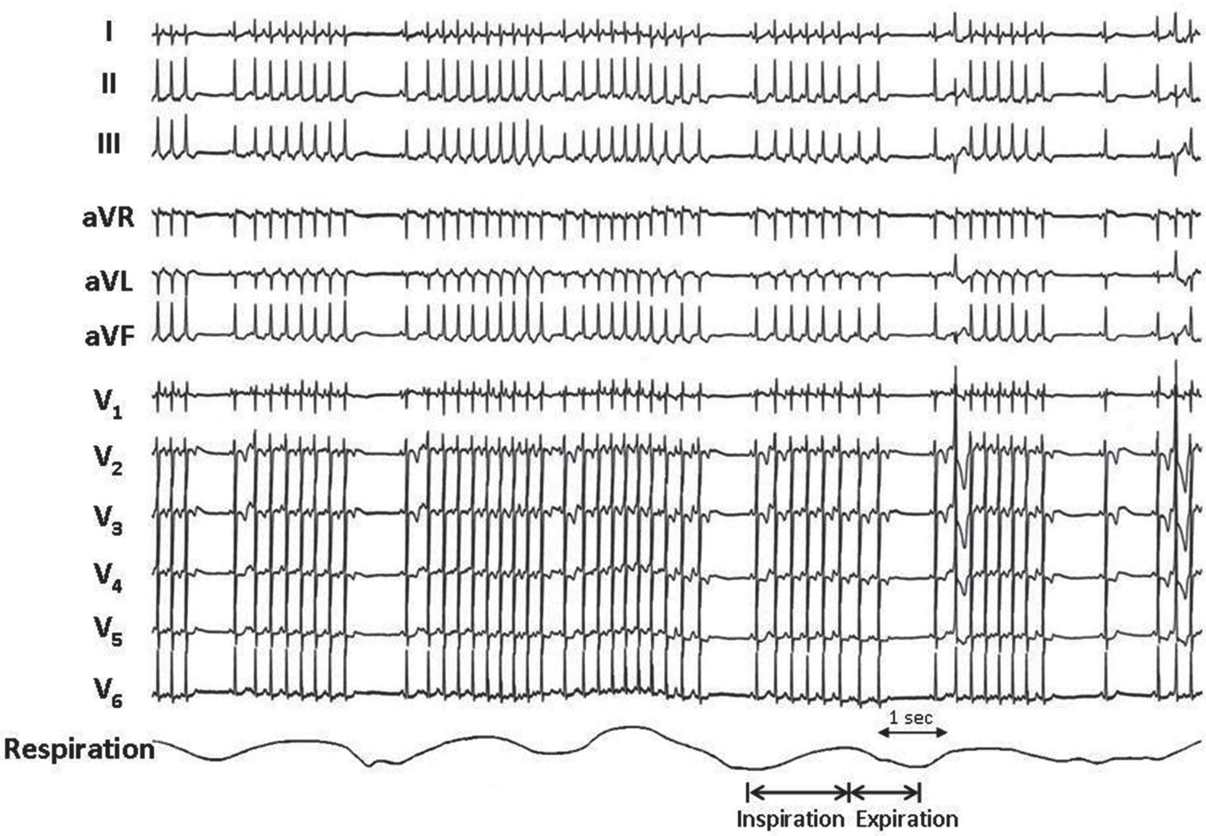

Figure 2


Medtronic
Viva™ XT CRT-D
Medtronic
Advisa MRI™
Medtronic
Evera MRI® ICD
Reveal LINQ™
SEEQ™