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Epicardial Approach: Technique to Prevent Complications

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Catheter ablation using the transcutaneous epicardial approach has been increasingly used to eliminate arrhythmias, including ventricular tachycardia (VT), epicardial accessory pathways, and atrial fibrillation. Catheter ablation from the epicardium is often required for VTs due to non-ischemic cardiomyopathy and is occasionally useful for some idiopathic VTs. In a recent survey of three tertiary centers, 17% of VT ablation procedures involved epicardial mapping[1]. Therefore, understanding the anatomy and the potential risk is important.

When to Consider Epicardial Ablation?

There have been publications on the ECG criteria for epicardial origins of VTs. Berruezo reported that a pseudo delta wave of ≥ 34 ms, intrinsicoid deflection time of ≥ 85 ms, and R/S complex duration of ≥ 121 ms are optimal parameters[2], and Valle identified 4 criteria (q waves in the inferior leads, pseudo-delta wave of ≥75 ms, maximum deflection index of ≥0.59, and q in lead I) with a specificity of ≥95% and sensitivity of ≥20% for identifying the origins with pace maps[3]. The electrocardiogram criteria suggesting an epicardial ablation target, lack the sensitivity and specificity to accurately predict which patients might need an epicardial ablation. Modern imaging technologies provide detailed anatomical information. Delayed enhanced cardiac magnetic resonance imaging (DE-MRI) is extremely useful. Reentry or focal VT in structural heart disease is always supported by myocardial scars.

Zeppenfeld reported a dominant epicardial scar distribution on the lateral left ventricle, and the ECG morphology of VT from this area showed Q waves in leads I and aVL, and in those cases, epicardial ablation is usually required[4,5]. Arrhythmogenic right ventricle dysplasia is characterized by the replacement of myocytes with fibro-fatty tissue involving the right ventricle and occurs from the epicardium to the endocardium.

What should be Evaluated Prior to the Epicardial Access?

The distance and direction of the pericardial space can be assessed by an echocardiogram via the subxyphoid space. If the liver is in the way to the access

of the pericardial space, the direction of the puncture can be marked on the body surface to avoid a liver puncture (Figure 1). The access can be confirmed by computed tomography (CT) as well (Figure 2). The anticoagulation status needs to be evaluated. Anticoagulation should be discontinued prior to the procedure, and bridged with heparin if necessary. Current consensus guidelines[6] and recently published safety data[1] advocate that pericardial access is avoided in anticoagulated patients and should be performed prior to systemic heparinization. Recently Page reported in a small number of patients that there were no increased hemorrhagic complications associated with epicardial ablation in heparinized patients[7]. They concluded that in patients who are not desirable to undergo a second session, their approach could be considered as an alternative to reversing heparin with protamine.

Figure 2. Saggital CT image at the central sternum

How to Perform the Epicardial Access?

Sosa et al. originally proposed a transcutaneous subxyphoid epicardial access[8]. A 17 to 19 G Tuohy needle, used for epidural anesthesia, is gently advanced from the subxiphoid puncture site toward the left shoulder at an angle of 45 degrees relative to the skin surface as the posterior approach, and 0 to 10 degrees as the anterior approach. For the posterior approach, a continuous check in the RAO
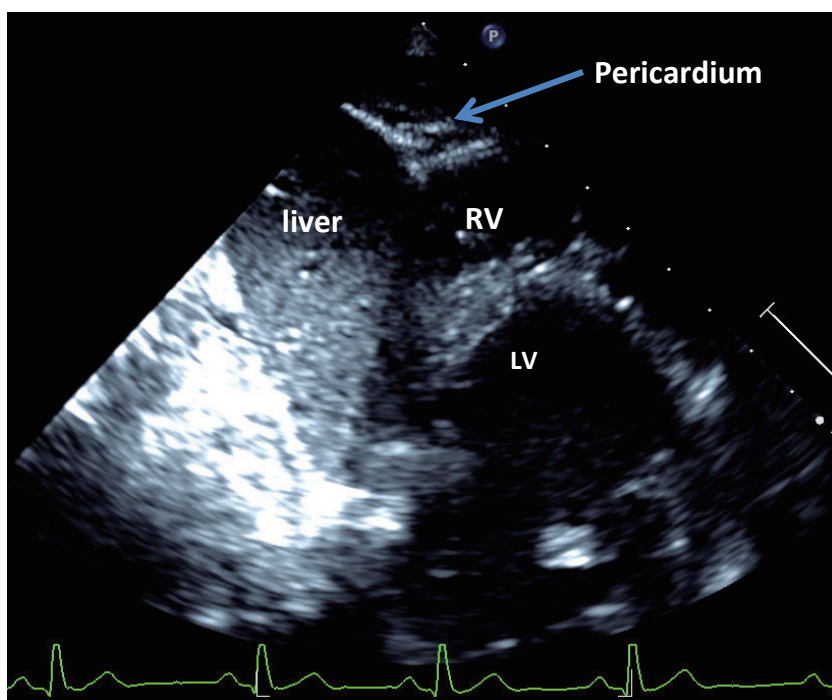
and LAO views, and the lateral view for the anterior approach can help to understand the direction. Following local anesthesia, a needle is advanced slowly until the pulsation of the heart can be felt. Then a small amount of contrast is injected into the needle. If tenting of the pericardium is seen, a small advancement of the needle can penetrate the fibrous pericardium, usually causing a palpable "give" and the contrast injection into the pericardial space is appreciated. Alternatively, continuous pressure monitoring can be used to confirm the needle tip in the pericardial space. It usually helps to evaluate the echo to see the distance and direction of the puncture. Maccabelli et al. used the pressure monitoring via the Tuohy needle[9]. Before entering the pericardial space the heart beat can be felt, and when the needle enters the pericardial space, a sudden drop in the pressure is clearly seen on the pressure curve.

Then a 0.034 spring wire is advanced into the pericardial space. We usually use a long wire (145cm) to confirm the wire is in the pericardial space, and not inadvertently into the cardiac chamber. The LAO view shows the wire is along the border of the heart. Then the sheath is advanced into the pericardial space. Once a

Figure 1. Echo image from the subxyphoid area
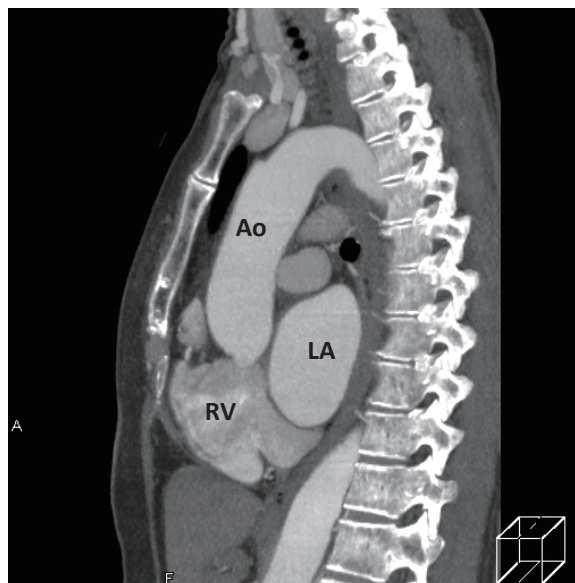*The direction and the distance to the pericardial space can be easily assessed.*

sheath is placed, drainage via the side port should be performed periodically. Sheaths should not be left alone, as the sharp edges can be traumatic. To improve the contact of the ablation catheter, a steerable sheath can be used. During mapping, either the irrigation can be stopped to prevent the fluid accumulation, or continuous negative suction can be performed to prevent any accumulation. Due to the lack of convective cooling, an external irrigation catheter is generally used. Epicardial fat can limit the lesion formation. Throughout the mapping process, an infusion rate of 0-2 ml/min may be used and increased to 10 -30 ml/min during ablation. Monitoring for an impedance fall is used to assess an adequate power delivery. A single sheath that is larger than the ablation catheter allows for aspiration of fluid from the side port.

A pericardial access in obese patients has been considered difficult, as it requires a steeper puncture, longer needle, and greater forward pressure as more tissue mass is penetrated. A recent study showed that obesity increased the procedural radiation dose, but not the risk of complications or procedural/ clinical failure[10]. Obesity should not preclude the use of an epicardial access when clinically indicated.

Choice of Surgical Pericardial Window

Postoperative pericardial adhesions were historically considered to be contraindications to a percutaneous epicardial access. A surgical subxiphoid or left lateral intercostal epicardial access has been used[11]. General anesthesia is required for the surgical access. However, recently several studies showed that percutaneous access could be performed safely[12,13]. As adhesions can be severe anteriorly, a posterior approach is chosen, and once the guidewire is inside the pericardial space, the adhesion can be disrupted either by a curved ablation catheter, pigtail catheter, or sheath.

Anatomy

The pericardium is a double-layered fibroserous sac; parietal and visceral layers. The visceral pericardium is adherent to the epicardium. The pericardial cavity exists as a continuous virtual space between these two layers. The parietal layer is attached to the diaphragm's central tendon and also to the posterior sternum by small ligaments that anchor and help to maintain the position of the heart. The details of the anatomical information have been elegantly described by D'Avila[14].

Complications

Complications occur with the access and mapping/ ablation.

Access

Most of the complications are related to the access. An inadvertent right ventricular puncture, resulting in a mild hemorrhage, is the most common complications. It is usually self-resolving if the patient is not anticoagulated, and it is usually recommended that heparin should be administered after the epicardial access or reversed prior to the access. Page et al. reported the safety of the epicardial access under anticoagulation[7]. If anticoagulation is necessary during the procedure, careful monitoring of the blood accumulation should be done. Rarely surgical intervention is required if only the needle or wire is penetrated.

Puncture of a sub-diaphragmatic vessel can cause intra-abdominal bleeding and can potentially require surgery. Also a liver puncture can occur.

Damage to the coronary artery has been experienced, and prior to the access, we usually perform a coronary angiogram to confirm that a large RV branch is not located close to the epicardial entry site. Also, as the edge of the sheath is stiff and sharp, a sheath should never be left without any catheter or wire inside.

A novel puncture needle with a radiofrequency energy (RF) delivery for easy access to the pericardial space and an electro-magnetic sensor to track the course of the needle have been reported[15]. The needle has a 0.036-inch outer diameter and is electrically insulated except for two small surfaces recessed from the tip. The virtual imaging system tracks the needle in real time within the thoracic anatomy. This can be useful for access in complex anatomies.

Mapping and Ablation

Prior to the ablation, a coronary angiogram should be performed to confirm a minimal distance of 5 mm from any arteries. Larger coronary arteries are probably protected by blood flow, and fat tissue, and smaller vessels are more prone to damage from the ablation[16]. If the ablation is performed on the lateral wall of the left ventricle, high output stimulation (10mA, 2ms) should be performed to identify the course of the phrenic nerve. If the patient is under general anesthesia, muscle relaxants should be avoided in order to observe the diaphragmatic stimulation. Phrenic nerve damage

can be prevented by phrenic nerve displacement using a deflectable sheath, ablation catheter, balloon, or saline and air injection into the pericardial space[17].

Fat tissue is the most problematic barrier for epicardial catheter ablation. The low electrical and thermal conductivity properties make it less likely for RF current and heat conduction to penetrate to the underlying myocardial tissue. Even an irrigation catheter cannot make lesions over fat tissue of 3.5 mm or more[18]. The amount and distribution of the fat tissue can be evaluated using 3D CT[19].

Pericarditis is one of the common complications, and is considered to be associated with the length and amount of epicardial ablation. Steroids (methylprednisolone 1-2mg/kg) can be injected intrapericardially prior to the sheath removal. In addition, we usually give colchicine 0.5mg bid for 2 days, which seems to suppress any uncomfortable symptoms and hopefully prevents adhesions of the pericardium.

Conclusion

Epicardial catheter ablation is an essential method to improve the efficacy of catheter ablation. Understanding the anatomy and knowing potential complications along with their solution is the key to a successful and safe epicardial access.

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New Technology Spotlight: WATCHMAN Device

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Left Atrial Appendage Closure: A Management Option for Your AF Patients

In March of 2015 after almost a decade of clinical study and regulatory scrutiny, the FDA approved the WATCHMAN device for U.S patients. Data from the Patient-level Meta-Analysis, recently published in the Journal of American College of Cardiology provided reassurance to the FDA that the WATCHMAN has a clear position in the management of patients with non-valvular AF at an increased risk of stroke who although eligible for warfarin, have an appropriate rationale to seek a non-pharmacologic alternative.[1]

"The recent results from the meta-analysis of the Watchman clinical trials and the carefully considered FDA approval of the therapy in the USA have firmly positioned Watchman as a key therapy consideration for all patients with atrial fibrillation." Dr Karen Phillips of Heart Care Partners, Brisbane Australia is reassured by the latest published results and regulatory approval in the U.S. A user of WATCHMAN in Australia since 2009, Dr Phillips is one of the most experienced implanting physicians in the Asia-Pacific region, having implanted over 120 devices to-date.

Dr Omar Razali from Institut Jantung Negara, Kuala Lumpur, Malaysia goes on further to advocate LAAC closure particularly among the Asian patient population. Asian patients have an increased risk of haemorrhagic stroke on warfarin and lower INR's.[2] "Most are taking warfarin rather than NOACs (Novel Oral Anticoagulants) but average TTRs is < 50%. To make matters worse, intracranial haemorrhage is higher amongst Asians." Dr Razali has also implanted over 100 WATCHMAN devices.

The WATCHMAN Left Atrial Appendage Closure (LAAC) device has been studied in four U.S. clinical trials, two of which were controlled prospective randomized trials comparing the WATCHMAN to warfarin and the other two were continued access registries. The four studies contributing to the analysis (PROTECT AF, PREVAIL, CAP, and CAP2) represent more than 2400 patients and nearly 6000 patient-years of follow-up.

Results from the randomised clinical trials of PROTECT AF[3] and PREVAIL[4] have been previously reported, however to evaluate the benefit-risk profile for the totality of data, the PROTECT AF and PREVAIL datasets were combined with all registry data and again analysed as a traditional patient-level meta-analysis. These results showed that local therapy with WATCHMAN provides similar benefit to warfarin for the composite efficacy endpoint of stroke, systemic embolism or CV death. Compared with long-term warfarin, patients randomized to WATCHMAN have a significant improvement in survival, particularly freedom from CV death.[5]

Although all-cause stroke rates are identical between groups, the pathophysiology of stroke was significantly different; with more warfarin patients experiencing haemorrhagic strokes and more device patients experiencing ischemic strokes. Also, although all-cause bleeding was similar between groups, when peri-procedural bleeding was excluded, bleeding rates were significantly higher in patients treated with chronic warfarin.[6]

WATCHMAN™ has shown consistent performance over all trials, after accounting for the stroke risk profile of the patients. This device is a viable option for patients left untreated for stroke. And when comparing the performance of the WATCHMAN Device to real-world untreated AF patients, device patients can expect a stroke risk reduction between 65%-81%.[7]

Conventional Treatment for the Prevention of Thromboembolism

Percutaneous closure of the LAA has the potential to change the clinical approach to stroke prevention in selected patients with AF[8]. For the most-part, long-term anticoagulation is the conventional treatment, whether it is with warfarin or other approved pharmacologic solutions. For

Ischemic Stroke Rate Aligns with Expected Rate Based on Risk Score (All Four Studies)
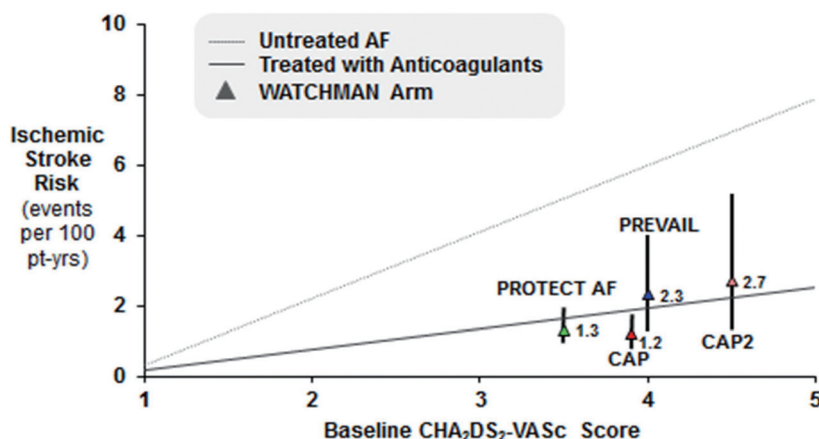
Consistent WATCHMAN™ stroke performance across all trials[6]

patients that cannot tolerate warfarin, direct thrombin or Factor Xa inhibitors been shown to provide comparable outcomes with less serious side-effects. But these newer agents, while attractive and effective, have not resulted in widespread adoption or increased treatment rates. Even within the clinical trials, approximately 1 out of every 5 patients discontinued anticoagulation after 2 years.[9-12] There are many reasons for this high rate of discontinuation ranging from lifestyle and dietary restrictions, to high cost of chronic medication.

However, the most serious concern is both the solution and the problem: bleeding. Any anticoagulation option still carries a significant major bleeding risk - a cumulative risk that many patients simply cannot bear over the course of their lifetime. While bleeds can range from gastrointestinal bleeding to severe bruising and frequent nosebleeds, the most feared risk is an intracranial haemorrhage which has devastating consequences for older patients. These strokes are often catastrophic, resulting in death or severe disability. Importantly, fear of brain haemorrhage or death impacts a patient's adherence to therapy and also a physician's willingness to prescribe anticoagulants in the first place.

In a review of 30 studies examining physicians' attitudes for prescribing warfarin for AF, bleeding risk and age were the most cited reasons for its underuse.[13] In the absence of an available alternative, many of these patients choose to forego therapy altogether and are left unprotected against stroke and its debilitating consequences. Furthermore,

data from a large U.S Medicare database show the percentage of patients using warfarin actually declined with increased risk of stroke. Nearly 50% of the highest stroke risk patients remain untreated.[14]

Anticoagulation in the Asian-patient Population

Asian patients have typically had a poorer response to OAC and NOAC therapy compared with non-Asian patients. Data from RE-LY, ROCKET-AF and ARISTOTLE all show that Asian patients spend less time in the therapeutic time for warfarin and have a high incidence of sub-therapeutic INR's.[15] It is also of note that in all these 3 trials, the annual risk of stroke and systemic embolization was higher in Asian-patients compared to non-Asian patients, regardless of whether the patients were assigned to warfarin or NOAC.[16-20]

Professor Teguh Santoso from Medistra Hospital in Jakarta believes that life-long stroke prophylaxis without the need for daily OAC is very attractive for use in Asian patients. "Relative or absolute contraindications to long-term anticoagulation are present in up to 40% of atrial fibrillation patients... In fact, anticoagulation is not currently utilized in up to 50% of eligible patients. Non-compliance is also an important issue for Asian patients"

Epidemiological studies have shown that intra-cerebral hemorrhage, relative to other stroke subtypes, is much greater in Asian-Pacific countries vs. Western regions.[21,22] It is for these reasons that

Professor Santoso will consider a WATCHMAN LAAC device for his eligible AF patients. "The results of our experience with the WATCHMAN™ LAA closure device… (have been) encouraging and comparable to those reported in the pivotal trials with this device".

There is an urgent need for a safe and effective device-based therapy to reduce the risk of cardio-embolic stroke as an alternative to long-term oral anticoagulation for high-risk patients with non-valvular atrial fibrillation. This need is further emphasized by several additional clinical observations that highlight the acceptance barriers, dosing difficulty, and adherence problems patients can encounter with long-term oral anticoagulant therapy (either warfarin or NOAC agents). As a consequence, many high-risk patients with non-valvular atrial fibrillation are left unprotected against cardio-embolic stroke.

Patient Selection

Patient selection for LAA closure has for the most part, come down to physician discretion or available funding. WATCHMAN™ was approved in Europe in 2005 and became commercially available in 2009 across much of Europe, the Middle-East and Asia-Pacific for non-valvular AF patients eligible for warfarin therapy but seeking an alternative for stroke risk reduction. Following results of the ASAP study results in 2012 the indications were expanded to include patients with a contraindication to anticoagulant therapy.[23,24] This is supported by current best-practice evidence-based clinical recommendations published in a variety of other international Guidelines[25-27] and echoed by the reimbursement recommendations of the UK's NHS[28] and HAS[29] France, where LAAC is included for consideration in patients with a contraindication to OAC.

Training for WATCHMAN™ Implantation

Clinical trial data have shown the WATCHMAN™ device can be safely implanted by properly trained physicians with varying levels of device procedure experience. Early procedure-related complications in PROTECT AF (9.9%) were reduced by over 50% in the 2nd half of PROTECT AF and all subsequent trials (4.8% PROTECT AF 2nd half, 4.1% CAP, 4.2% PREVAIL, 3.8% CAP2). Almost 50% of implants in PREVAIL were performed by appropriately trained new operators, demonstrating that learnings and implant techniques are transferrable through a robust training program.[30] The Boston Scientific WATCHMAN University™

training platform includes online learning modules, interactive case studies, simulation training, case observance at experienced centres and expert physician proctorship.

The development of a safe, efficacious and successful Left Atrial Appendage Closure Program requires collaboration and commitment. Successful programs are often those where Electrophysiology and Interventional Cardiology colleagues partner to establish strong referrer networks, and commit to therapy awareness activities which help to maintain adequate case volumes.

Combined AF Ablation and WATCHMAN™ Implantation

Catheter ablation therapy for atrial fibrillation is an efficacious and accepted rhythm control strategy for patients with symptomatic, drug-refractory AF but there is little evidence to suggest it plays a role in stroke prevention when compared with conventional anticoagulation therapy. Patients with symptomatic AF referred for a left atrial catheter ablation may be in¬terested in undergoing concomitant intervention with left atrial appendage closure to avoid a second procedure.[31]

Dr Karen Phillips has one of the largest patient cohorts of the combined approach. It is her belief that the WATCHMAN procedure is a natural extension of the skills used during AF ablation given the electro physiologists familiarity in navigating the LAA.

"In experienced hands the WATCHMAN implant appears to add minimal additional risk to an AF ablation procedure". She goes on to say that "patients need to clearly understand the limitation of AF ablation – we need to be honest with them about the possibility of long-term recurrences of AF and reinforce that the clinical guidelines still don't support stopping oral anticoagulation for patients with high stroke scores. It's amazing to see the life-changing benefits that AF ablation offers patients but I sometimes wonder if the prognostically more important procedure I am offering these people in the WATCHMAN implant".

The combined approach has been shown to be efficacious, and in many instances may be the preference for patients who otherwise would need to remain on anticoagulation therapy long-term. Although further long-term studies to examine the effectiveness of the combined procedure are warranted, it is expected there will be an increase in adoption of this and other combined approaches in the future.

APHRS Asia Pacific Heart Rhythm Society

The Next Generation; WATCHMAN FLX™

A new generation of WATCHMAN has been designed with the aim of improving implant performance. Expected to launch in Europe in late 2015, the WATCHMAN FLX™ device has several design enhancements that will allow treatment for a broader range of patients. These include patients with smaller, larger and shallower appendages.

The most notable enhancements includes a closed, atraumatic distal end with fluoroscopic marker which enables the device to be fully recaptured and re-deployed as well as advanced into the LAA whilst in a partially deployed state. The device is approximately 10% shorter than the current generation, and has more struts to increase device conformability. The anchor design has changed to include 2 rows of "J-shaped" anchors that provide additional stability whilst allowing the device to be recaptured without risk of the anchors damaging the access sheath or becoming inverted on recapture. The device also allows for a greater compression (up to 27%) and allows for more overlap in device size selection compared to the current WATCHMAN device.

In a pre-clinical chronic GLP study with WATCHMAN FLX™, twelve canines were implanted with the new device. Because of the greater allowable device compression and the ability to reposition the device more distally after a full recapture, all twelve implants were successful with the first device chosen. There were no residual device leaks measured by TEE in any of the twelve animals either at implant, or follow-up (45 days or 90 days).[32] Clinical assessment of the WATCHMAN FLX™ device will commence in 2016.

Conclusion

The issues of stroke prevention in patients with AF are extremely important. LAA closure is increasingly being recognised as an appropriate consideration for those at high risk for stroke for whom effective anticoagulant therapy is either not available or not appropriate. As the pool of clinical evidence grows and implant experience is strengthened, more patients will have access to this therapy as clinical guidelines and reimbursement agencies align with the growing consensus.

With over 10,000 devices implanted worldwide, proven long-term data from randomised trials and multi-centre registries, the vast evidence base

supports the WATCHMAN™ device which is available in over 55 countries worldwide, including much of the Asia-Pacific region.

This article can be used or distributed only in countries where the product is approved.

Current Generation WATCHMAN™

Next generation WATCHMAN FLX™

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ECG Quiz

The model commentary will be provided in the next issue No.22

Yong-Seog Oh, M.D., Ph.D.

Division of Cardiology, Department of Internal Medicince, College of Medicine,
Seoul St. Mary's Hospital, The Catholic University of Korea

A 36 year old woman presented to our hospital with palpitation. During electrophysiology study, supraventricular tachycardia was induced of which CL was changed during tachycardia.
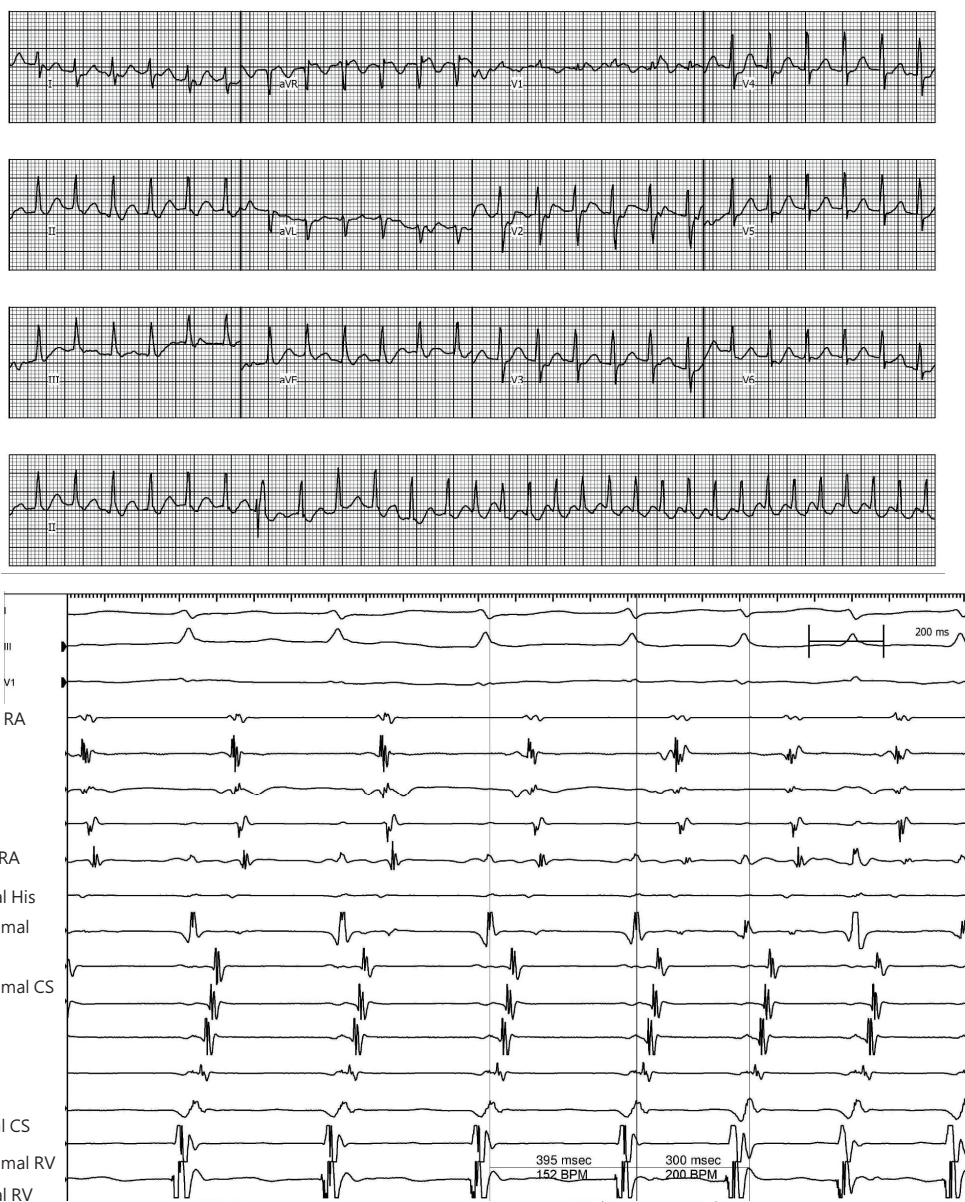
Question: What is the possible explanation of tachycardia cycle length change
1. Dual accessory pathway
2. Anterograde reentrant tract change from slow pathway to fast pathway
3. Reentrant tract change from AVRT to AVNRT
4. Bundle branch block

EP Image:
Transseptal Puncture for Lipomatous Hypertrophy of the Interatrial Septum

Huang-Chung Chen, MD, Mien-Cheng Chen, MD

Division of Cardiology, Department of Internal Medicine, Kaohsiung Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Taiwan

A 67-year-old obese gentleman with medical history of hypertrophic cardiomyopathy and drug-refractory paroxysmal atrial fibrillation was admitted for radiofrequency catheter ablation under general anesthesia. Pre-operative transesophageal echocardiography revealed significant hypertrophy of interatrial septum. A 256-multislice cardiac computed tomography (CT) revealed dumbbell shape fat deposition of interatrial septum with sparing of fossa ovalis, compatible with lipomatous hypertrophy of the interatrial septum (LHIS) (Figure 1). To avoid any possible inadvertent manipulation of the transseptal puncture needle, septal puncture was performed under the guidance of transesophageal echocardiograpy (TEE) (Figure 2). After successful transseptal puncture, electrical isolation of four pulmonary veins by ipsilateral circumferential pulmonary vein isolation was performed smoothly and no atrial fibrillation was inducible by programmed atrial stimulation after ablation.

Lipomatous hypertrophy of the interatrial septum is a benign disorder characterized by fatty deposits in the interatrial septum with typical sparing of the fossa ovalis and a thickness of > 2 cm, and is usually associated with extensive subepicardial adipose tissue[1]. It typically occurs in elderly, or obese patients with the incidence of about 2-3%[1]. The presence of LHIS can be associated with arrhythmia, especially supraventricular arrhythmia[2]. LHIS is showed as a nonenhancing marginated homogenous dumbbell shape mass on multislice CT[2]. If LHIS is found incidentally in atrial fibrillation patients undergoing catheter ablation, the transseptal puncture may be difficult. The transseptal puncture should be performed under the guidance of TEE or intracardiac echocardiography to have puncture accurately via fossa ovalis to prevent possible complications, such as fat embolism, or perforation to pericardial space.

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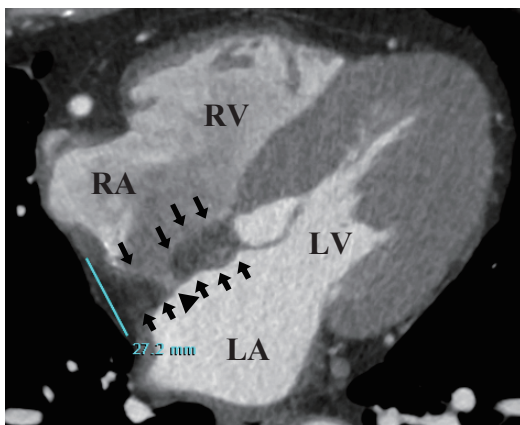
Figure 1. Computed tomography revealed lipomatous hypertrophy of the interatrial septum (black arrow) with sparing of the fossa ovalis (black arrowhead).
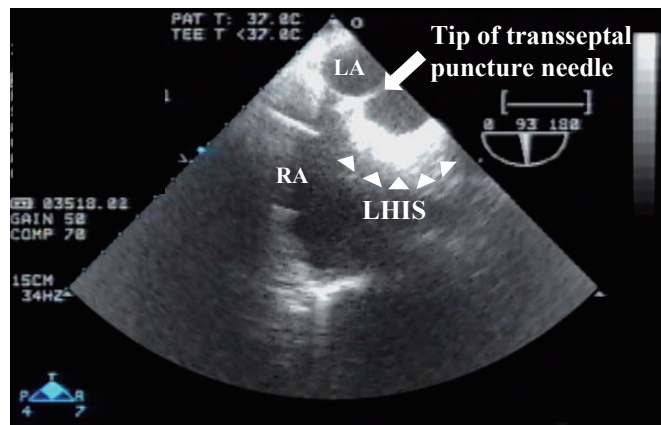

Figure 2. Lipomatous hypertrophy of the interatrial septum (LHIS) (white arrowhead) was noted during examination of transesophageal echocardiography (TEE). Tip of transseptal puncture needle (white arrow) tented fossa ovalis under the guidance of TEE.

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APHRS Asia Pacific Heart Rhythm Society

Heart & General Hospital
Jaipur, State of Rajasthan, India
Dawn Of Cardiac Electrophysiology

Rahul Singhal, M.D., D.N.B., MNAMS

Chief Cardiac Electrophysiologist and Senior Interventional Cardiologist
Department of Electrophysiology and Cardiac Pacing,
Heart and General Hospital, Jaipur, India

Hospital Overview

Heart and General Hospital is a unit of Cardiac Care and Allied Health Pvt. Ltd. since 1987 in the heart of Pink City, Jaipur, India. Almost for over two and half decades of dedicated healthcare through excellence and professional efficiency, it has established its legacy beyond par in Cardiac healthcare not only in the state of Rajasthan as well as in North India.

Since its inception, Heart and General Hospital is recognized as the leading, comprehensive cardiac care provider with the commitment for attainment of progressive greater heights in the treatment of heart diseases. It offers complete range of care in Cardiology and Cardiac surgery along with other specialties. Hospital has lived up to a very high ethical and professional standards, by adopting clinical excellence, a warm patient centric approach, continuous innovation& upgradation and quality improvement. By these high standards it has been able to meet the stringent benchmarks needed and has been getting accredition from NABH, NABL and ISO 2000:9001 from last many years.


Hospital Contact

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Phone : 0141-2370271
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Email : heartghospital@gmail.com

Department of Cardiology

Director: Dr. Prakash Chandwani, MD, DM (Cardiology)
Dr. G. Bhambhani, MD, FACC
No. of Cardiologist: 6
Cardiac Electrophysiologist: Dr. Rahul Singhal, MD, DNB (Cardiology)
(Research and Fellowship in Cardiac Electrophysiology – VGH, Taipei, Taiwan)

Access Information

Heart and General hospital is located in centre of Jaipur in C-Scheme in State of Rajasthan.

Heart & General Hospital, Jaipur
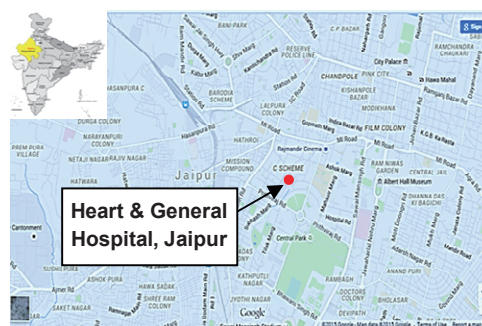
Division of Cardiology

Department of Cardiology encompasses world's best technology and treatment protocols for cardiac patients. It has two 'State of the Art' Digital Cath Labs with Electrophysiology setup.The department is run by expertise team of 6 fully qualified cardiologists (D.M. & DNB in cardiology) headed by Dr.Prakash Chandwani, Chief interventional cardiologist with more than 17 years of vast experience. On an average around 800 Cath lab procedures per month are performed. Almost full spectrum of cardiology services are provided like Coronary angiography, Coronary angioplasties, BMV, BPV, Device Closure (ASD, PDA), Peripheral, Carotid, Renal angiography & angioplasties, Complex Angioplasties (Left main, bifurcation, ostial angioplasty) as well as calcified

lesions through Rotablation. Besides this the catheterization laboratory of hospital regularly performs Primary and Rescue angioplasties for acute heart attack in critically ill patients with excellent success rate. The services are fast and efficient with excellent patient care and satisfaction. Heart & General Hospital team believes that compassion and comfort is the cornerstone of care.

Department of Electrophysiology & Cardiac Pacing

The department of Electrophysiology and cardiac pacing was in gestational period before 2013. Dr. Rahul Singhal, Chief Cardiac Electrophysiologist and Senior Interventional Cardiologist has been actively involved in setting up the department of Cardiac Electrophysiology after his joining. Dr. Rahul Singhal, has worked for 10 years in department of Cardiology at renowned Escorts Heart Institute & Research Centre (EHIRC), New Delhi, India. He has completed Fellowship in Cardiac Electrophysiology at Taipei Veterans General Hospital, Taiwan, with basic and clinical research under leadership of pioneer of Electrophysiology Dr. Shih Ann Chen. He Received 3rd best Clinical Paper award at Asia Pacific Heart Rhythm Society (APHRS) 2012, Taipei for – "Correlation of Quantity and Distribution of Epicardial Left Atrium Fat with Atrial Fibrillation (AF) Nest in Patients with Atrial Fibrillation". He along with his team has taken department of electrophysiology to a new height which now offers excellent diagnosis and treatment options for heart rhythm problems (cardiac arrhythmias). Now all kinds of Device Implantation including pacemakers, ICD's & COMBO devices and Electrophysiology & Radiofrequency Ablations are being done here.

In 2014, nearly 460 electrophysiological interventions were performed, including 37 devices (CRT-P 10; CRT-D 15; ICD 12); 184 pacemakers and 240 EP studies and RF ablations (including SVT's, RVOT VT/PVC's, Fascicular VT, Atrial Flutter and AT). He had done 1 case of AVNRT ablation in a patient with dextrocardia which was first of its kind in Jaipur and rarely reported elsewhere. Recently his paper titled "Intrinsic cardiac autonomic ganglionated plexi within epicardial fat modulate the atrial substrate remodelling: Experiences from atrial fibrillation patients receiving catheter ablation" has been accepted by International journal Acta Cardiologica Sinica, with the contribution from VGH team in Taipei.

Interest and Future Vision

Coronary Angiography and Angioplasties, Electrophysiological Studies, Catheter RF Ablation of Complex arrhythmias, 3D Mapping of Cardiac Arrhythmias with CARTO and Ensite, Implantation of Permanent Pacemakers, Implantation of ICD's, Implantation of Biventricular pacemakers (CRT), Implantation of CRT-D (Combo Device).

Our vision for future is to take department of cardiology and cardiac electrophysiology and pacing to the pinnacle by virtue of providing Clinical Excellence and Distinctive Patient Care and to be a globally respected healthcare organization. Dr. Rahul Singhal has distinctive aim and vision to continuously improve and innovate to exceed expectations, to adopt a 'can-do' attitude.

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ECG Commentary Related to the Quiz in the No. 20 Issue

Masahiko Fukatani, MD

Director, Division of Cardiology, Department of Internal Medicine
Chikamori Hospital, Chikamori Medical Group, Kochi, JAPAN

Answer:

4. Reversed Typical Atrial Flutter (Right atrium, CTI dependent, CW)

ECG Commentary:

The ECG has no isoelectric line between atrial activities, and is not like focal atrial tachycardia. This is more likely a kind of macro-reentrant atrial flutter. However, flutter wave morphology is different from that of typical, cavotricuspid isthmus (CTI)-dependent and counterclockwise (CCW) AFL. ECG findings of this clockwise (CW) AFL are characterized by positive flutter waves in inferior leads (II, III, aVF) and V6, and negative in V1. Flutter waves are notched in all ECG leads. Fig. 1 shows 12 leads ECGs of 3 cases of CTI-dependent CW AFL. Although the surface ECG has a high value in determining the rotation sequence in the case of CTI-dependent AFL, the correlation between flutter wave appearance and the underlying reentrant circuit is imperfect. A typical CTI-dependent CW pattern is also seen in patients with upper-loop reentry of the right atrium, which is non-CTI-dependent. Atypical right and left AFLs have highly variable flutter wave morphologies and may resemble typical flutter in surface ECG. Various types of right and left AFLs listed as followings might be possible.

1. Right atrial flutter: (1) CTI-dependent CCW, (2) CCW lower-loop reentry (CTI-dependent), (3) CTI-dependent CW, (4) CW upper-loop reentry (non-CTI-dependent), (5) macro-reentry in the right free wall,
2. Left atrial flutter: (1) septal circuit (around fossa ovalis), (2) mitral annulus, (3) posterior wall scar circuits,
3. Incisional reentrant tachycardia with prior cardiac surgery,
4. Dual-loop reentry or complex reentrant mechanisms.

Therefore, the use of electro-anatomical mapping system in addition to the electrophysiologic study is necessary for the differential diagnosis of the mechanism of AFL. Fig. 2 shows an electro-anatomical activation mapping of this patient using CARTO system. It showed a feature of CW rotation around the tricuspid annulus. The entrainment pacing at the CTI demonstrated the concealed entrainment phenomenon, and confirmed the flutter as CTI-dependent. Radiofrequency applications at the CTI terminated the long-term persistent AFL of CTI-dependent and CW rotation.

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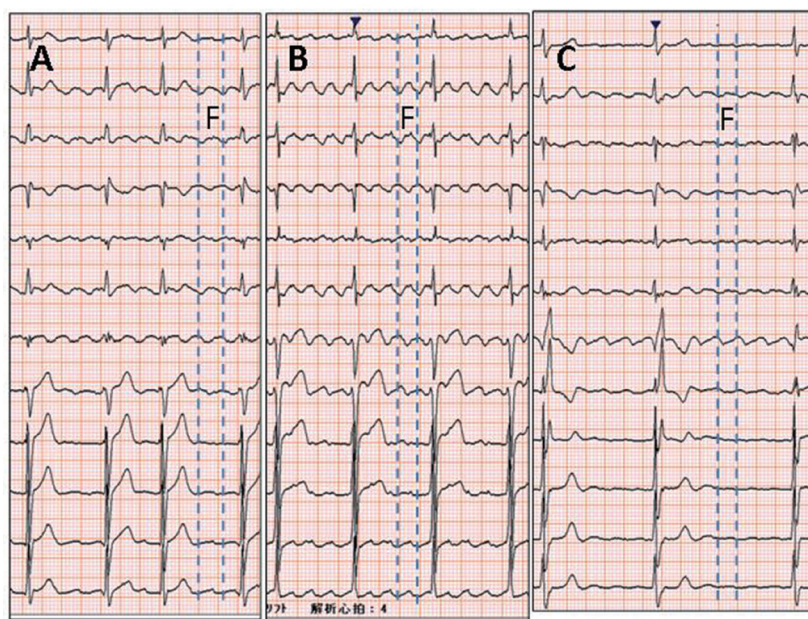
Fig. 1. Twelve leads ECGs of 3 cases of CTI-dependent CW AFL. Panel A is the present case. Panels B and C are another 2 cases. A flutter wave (F) of one cycle length is depicted in each panel.
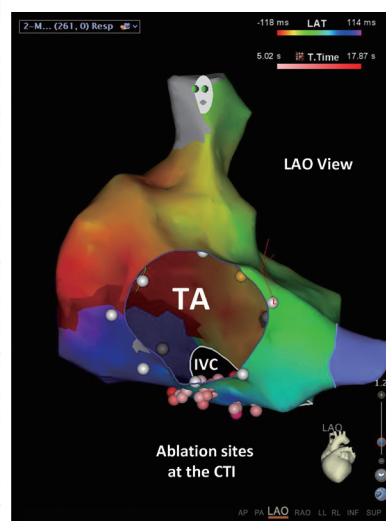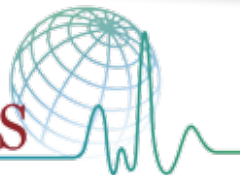

Fig. 2. CARTO map of the whole right atrium illustrates clockwise (CW) rotation around the tricuspid annulus (TA). LAO=left anterior oblique projection. IVC=inferior vena cava, CTI=cavotricuspid isthmus.

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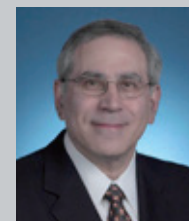## KEY SPEAKERS

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Morning		Scientific sessions Late breaking trial oral presentations EPIC EP alliance session Chinese language stream	Scientific sessions Young Ianvestigator Award oral presentations Arrhythmias for the non EP cardiologists	Scientific sessions Japanese joint session TTS session one Changing the world, one tweet at a time
Lunch	Sponsor workshops	Lunchtime symposia Mini oral presentations	Lunchtime symposia Mini oral presentations	Lunchtime symposia Mini oral presentations
Afternoon		Inaugural APHRS Regional Keynote lecture Scientific sessions Abstract oral presentations Chinese language stream EHRA joint session	Inaugural APHRS International Plenary lecture Scientific sessions Arrhythmias for the non EP cardiologists Surgery debates HRS joint session	Scientific sessions TTS session two Abstract oral presentations Indian joint session
Evening	Registration open Welcome reception and opening ceremony	Faculty dinner	Networking reception	

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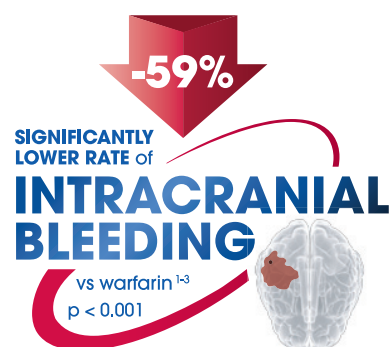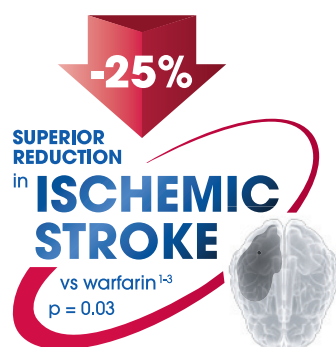 @APHRS15
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