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ELECTRICAL CURE FOR MECHANICAL FAILURE-RADIOFREQUENCY ABLATION OF ACCESSORY PATHWAY IN A PAEDIATRIC PATIENT WITH LV DYSFUNCTION

Written by: Dr Sukriti Raina, Dr Jacqueline U Ejituwu, Dr Aparna Jaswal

A 10-year-old Iraqi boy presented with history of recurrent palpitations for the past 3 years. Baseline ECG showed no evidence of pre-excitation. He had several episodes of documented incessant short RP narrow complex tachycardia (Fig 1). 2D echo showed decline in left ventricular function from an ejection fraction of 60% to 30% over a period of one year.

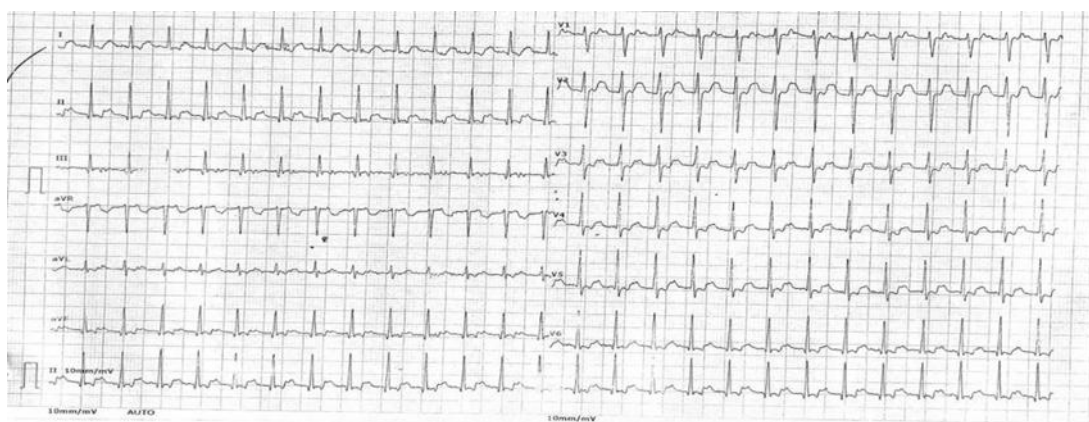


Fig 1: Narrow complex short RP tachycardia.



Fig 2: EGMs showing narrow complex, short RP tachycardia with concentric pattern of activation.

He underwent an electrophysiology study in Iraq 6 months ago and a diagnosis of atrioventricular reciprocating tachycardia (AVRT) with concealed accessory pathway at mid-septum was made. He underwent radiofrequency ablation which was unsuccessful. He also had an episode of transient complete heart block documented during the procedure following which the procedure was abandoned. In view of his incessant tachycardia and declining left ventricular function, he was referred to our centre for further management. At presentation to our facility, he was evaluated and planned for electrophysiology study with 3D mapping and radiofrequency ablation.

During EP study, no pre-excitation was documented. The tachycardia with a cycle length of 380 msec was easily induced with short burst of atrial pacing. It was a short RP (VA interval 86 msec) narrow complex tachycardia with concentric pattern of activation (Fig 2). Post pacing interval on entrainment from right ventricular apex was 425 msec at the tachycardia cycle length 380 msec, PPI-TCL was 45 msec favoring a concealed accessory pathway. VA interval during tachycardia and ventricular pacing was 86 msec vs 142 msec respectively (SA-VA = 56 msec, favoring AVRT). 3D mapping showed ventricular and atrial electrograms in conjunction with discrete

Ablation was attempted from the right mid septal region with earliest local activation time of -33 msec in relation to reference which was atrial EGM at coronary sinus 9,10 electrode pair in our case (Fig 4a). Radiofrequency ablation lesion was given in this area. It had close proximity to the AV node and despite one lesion at 50°C at 40 Watt the pathway persisted. Thus, an alternative retroaortic approach was considered.

Mapping of aortic cusps through retroaortic approach was performed. An aortogram with 6F pigtail catheter was done to delineate the relationship of coronary ostia with respect to aortic cusps (Fig 5 & 6). Mapping during tachycardia revealed earliest local activation time of -23msec in close proximity to non-coronary cusp (Fig 4b). Radiofrequency ablation with 4 mm irrigated tip FlexAbility catheter at 40°C at 30 Watt lead to successful termination of tachycardia within 4 seconds (Fig 7). Post-ablation, there was no VA conduction and tachycardia was no longer inducible. Patient was discharged a day after the procedure with no post procedure complications.

On follow up after 1-week, the patient was asymptomatic with improved LVEF to 50% on review echo.

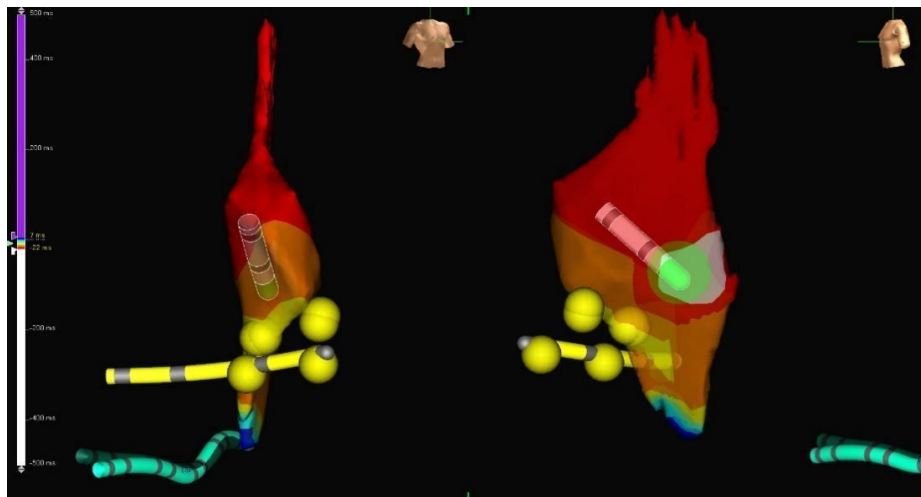


Fig 3: A 3D Map showing the RAO and LAO views of the geometry (RAO and LAO respectively)

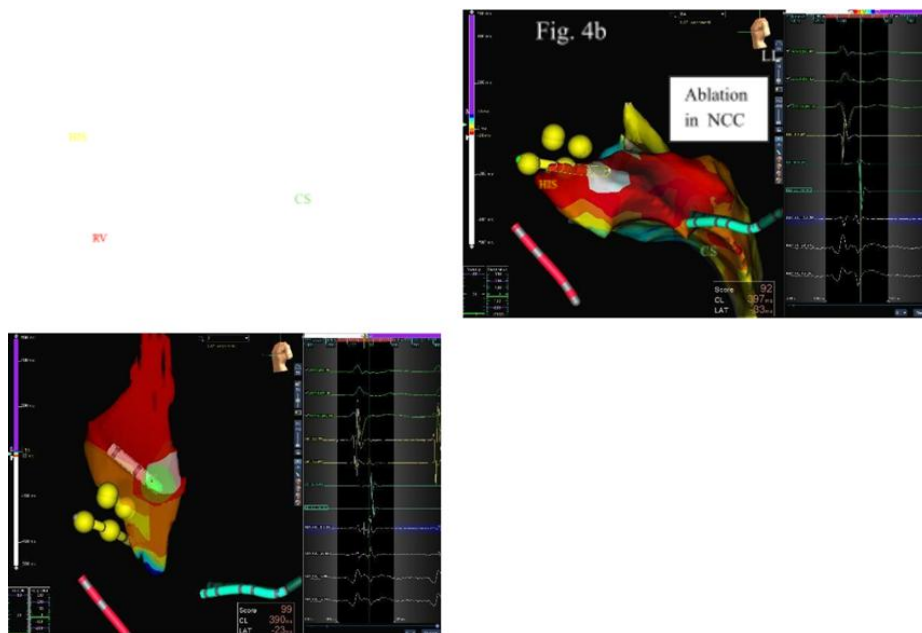


Fig 4a: White spot indicates location of attempted lesions at Right mid septum.

Fig 4b: White spot indicates ablation site in Non-Coronary Cusp via retro aortic approach

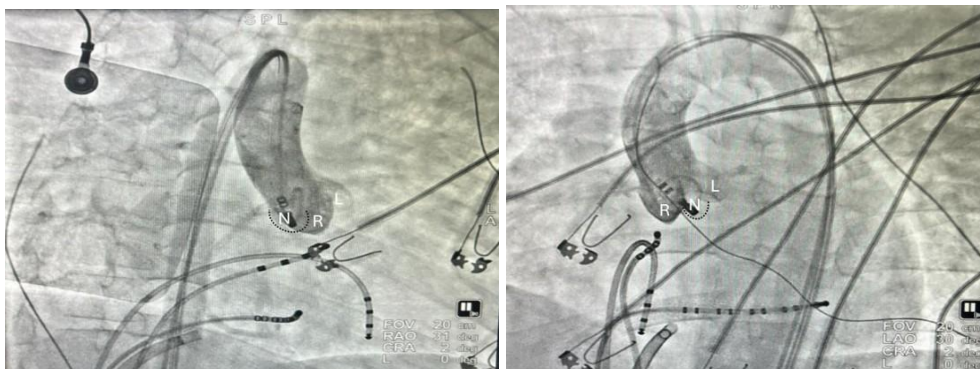


Fig 5 & 6: An Angiogram done with pigtail catheter positioned in the aortic root (RAO 30o and Fig. 4: LAO 30o), N-Non coronary cusp, R-Right coronary cusp, L-Left coronary cusp.

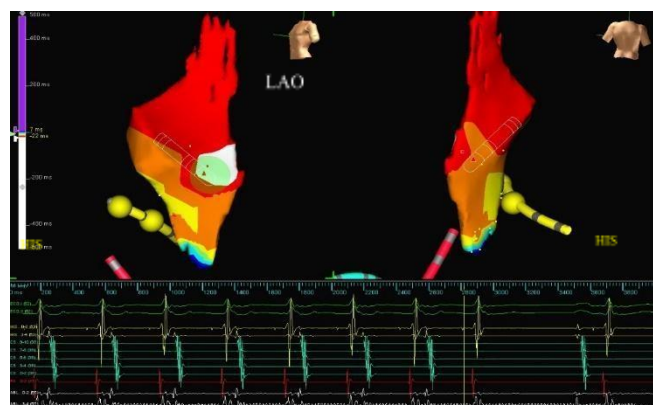


Fig 7: Termination of tachycardia within 4 sec of RFA through Non-Coronary Cusp. (Green halo around at the white spot indicates catheter contact)

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2. Kovach JR, Mah DY, Abrams DJ, et al. Outcomes of catheter ablation of anteroseptal and midseptal accessory pathways in paediatric patients. Heart Rhythm. 2020;17(5 Pt A):759-767. doi:10.1016/j.hrthm.2019.12.008

INDIAN WOMEN IN ELECTROPHYSIOLOGY: A RISING FORCE INDIAN WOMEN IN EP: HOBNOBBING WITH LEADLESS PACEMAKER-NO STRINGS ATTACHED

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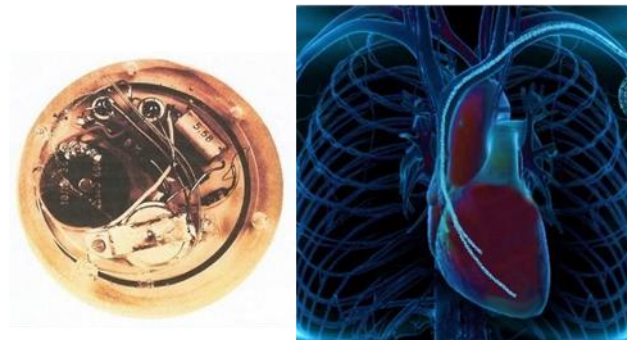
The field of cardiac electrophysiology (EP) is witnessing a paradigm shift with the advent of leadless pacemakers—devices that eliminate the need for transvenous leads and surgical pockets. In India, women electrophysiologists are increasingly adopting and mastering this technology, contributing to its evolution and clinical integration. This article explores the historical development of pacing systems, the emergence of leadless devices such as Micra VR, Micra AV, Aveir VR, and the recently introduced Aveir DR, and highlights implantation techniques, patient selection criteria, and future trends. Special emphasis is placed on the role of Indian women EPs in advancing leadless pacing.

Introduction

Cardiac pacing has evolved dramatically since its inception in the mid-20th century. Initially reliant on bulky external devices, the field progressed to transvenous systems with subcutaneous pulse generators and leads. While effective, these systems introduced complications such as lead fractures, infections, and venous obstruction. The emergence of leadless pacemakers marks a significant leap forward, offering a minimally invasive, self-contained solution for bradycardia management. In India, women electrophysiologists are playing a pivotal role in adopting and refining this technology, challenging traditional gender norms in a historically male-dominated specialty.

Historical Perspective and Evolution of Pacing

The first implantable pacemaker was introduced in 1958 by Senning and Elmqvist. Over the decades, pacing systems became more sophisticated, yet remained dependent on transvenous leads. These leads while essential for signal transmission were associated with long-term complications. The need for a safer, more durable solution led to the development of leadless pacemakers—devices implanted directly into the heart via a femoral venous approach, eliminating the need for leads and surgical pockets.

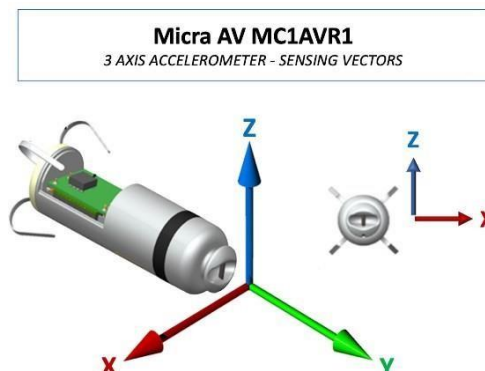
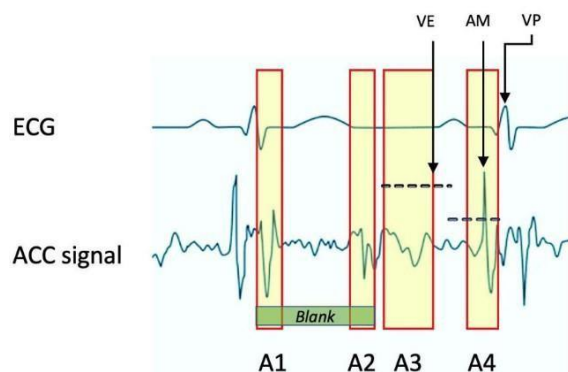


Leadless Pacemaker Technologies: MICRA and AVEIR Series

1. Micra VR and Micra AV

Developed by Medtronic, the Micra VR was the first commercially available leadless pacemaker, offering single-chamber ventricular pacing. The Micra AV followed, introducing atrioventricular synchrony through accelerometer-based sensing, expanding its applicability to patients requiring AV synchrony. The device incorporates an algorithm that utilizes the accelerometer data to deliver ventricular pacing in sync with the detected atrial contractions.





Device Design and Engineering

- **Size and Structure:** The Micra device is about the size of a large vitamin capsule (25.9 mm in length, 6.7 mm in diameter) and weighs only 2 grams.
- **Fixation Mechanism:** It uses nitinol tines for passive fixation to the right ventricular endocardium, ensuring secure placement without active screwing.
- **Materials:** Constructed with titanium and parylene coating for biocompatibility and durability.

Implantation Procedure

- **Access and Delivery:** Delivered via a 23 French introducer sheath through the femoral vein. The catheter-based delivery system allows precise placement under fluoroscopic guidance.
- **Procedure Time:** Average implantation time is under 30 minutes, with most patients discharged within 24 hours.

Micra AV Synchrony Algorithm

Accelerometer-Based Sensing: Detects atrial mechanical contractions using a 3-axis accelerometer.

- **Algorithm Functionality:** The device identifies atrial contraction patterns and times ventricular pacing accordingly to maintain AV synchrony.

Implant Success Rate: The Micra Transcatheter Pacing System (TPS) has demonstrated a high implant success rate of 99.2% in the pivotal Micra IDE study (Reynolds et al., 2016, NEJM).

Major Complication Rate: The 12-month major complication rate was 4.0% (95% CI, 2.9– 5.6), which is significantly lower than the 7.4% rate observed in a historical control group with transvenous pacemakers ($p=0.001$).

Lead/Pocket Complications: The Micra system eliminates the need for leads and a surgical pocket, resulting in a 63% reduction in major complications compared to traditional systems (El-Chami et al., 2018, Heart Rhythm).

Battery Longevity: Projected battery longevity is 12 years at typical pacing settings (El-Chami et al., 2022, JACC: Clinical Electrophysiology).

Stable Pacing Thresholds: Pacing thresholds remained low and stable over 5 years, with a mean threshold of 0.61 ± 0.40 V at 0.24 ms at 5 years (El-Chami et al., 2022).

Infection Rate: The rate of device-related infection is $<0.5\%$, with no reported cases of device infection requiring extraction in the major studies.

Vascular Complications: Major vascular complications occurred in 1.6% of patients (Reynolds et al., 2016).



The Micra Transcatheter Pacing System (TPS) is the world's first leadless pacemaker, developed by Medtronic. The Micra Clinical Trials evaluated its safety and efficacy in patients with bradyarrhythmias. The **newer Micra AV2 and VR2** models build on this technology, offering improved features and longevity.

Key Improvements: Extended battery life (up to 16-17 years), enhanced programming, and improved AV synchrony algorithms.

Clinical Data: As of 2023, real-world registry data and post-market studies confirm continued high implant success (>99%) and low complication rates (<2% at 12 months).



2. Aveir VR and Aveir DR

Abbott's Aveir VR introduced a modular approach with retrievability and mapping capabilities. The recently launched Aveir DR represents a breakthrough in dual-chamber leadless pacing, enabling synchronized atrial and ventricular pacing through conductive telemetry between two implanted devices. This innovation significantly broadens the scope of leadless therapy, making it suitable for a wider patient population.



Implantation Techniques and Safety Innovations

The AVEIR leadless pacemaker system—both single-chamber (VR) and dual-chamber (DR)—is implanted via a femoral venous approach, eliminating the need for a chest incision or subcutaneous pocket. A small incision is made near the femoral vein, through which the AVEIR Delivery Catheter is introduced to navigate to the target chamber of the heart (right atrium or right ventricle).

The Aveir system offers enhanced safety features, including

- Active fixation helix for secure anchoring.
- Retrievability for repositioning or removal.
- Mapping capability to identify optimal implant sites before deployment.
- Minimally Invasive Femoral Access.



Targeted Chamber Deployment

AVEIR VR is implanted in the right ventricle, typically on the septal wall.

AVEIR DR involves two devices: one in the right atrium and one in the right ventricle, enabling AV synchrony through wireless communication.

Active Fixation Mechanism

Each AVEIR device features an active fixation helix that anchors the pacemaker securely to the endocardial tissue. This design allows for:

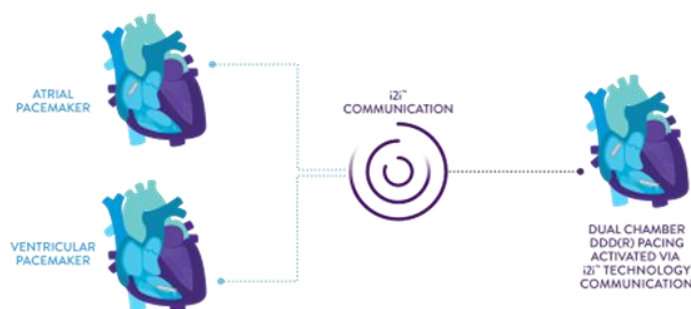
- Stable placement.
- Reduced risk of dislodgement
- Retrievability, if repositioning or replacement is needed



Mapping Before Deployment

The delivery system allows for electrophysiological mapping prior to deployment, helping physicians identify the optimal implant site. This reduces procedural uncertainty and enhances safety.

In the dual-chamber AVEIR DR system, the atrial and ventricular devices communicate using conducted communication — a low-energy, saltwater - conductive signal that mimics. Bluetooth-like messaging. This ensures synchronized pacing with minimal battery drain. AVER DR leadless pacemaker system demonstrated AV synchrony in 98% of evaluable beats at 3 months after implantation. AV synchrony was maintained across postures/activities and remained robust for heart rates >100 bpm.



Post- Implantation Benefits

- No visible chest bump or scar.
- No lead- related complications (e.g., fracture, thrombosis).
- Immediate mobility—patients can resume upper-body movement without restrictions.
- These features reduce procedural risks and improve long-term outcomes, making the technology particularly attractive to early-career women EPs seeking precision and safety.



Patient Selection Criteria for Leadless Pacemaker

Leadless were initially limited to specific cohort primarily due to only availability of ventricular pacing capabilities only but recently launched AVEIR DR opens then leadless option to much larger population covering all with pacing indications.

Leadless pacemakers are ideal for:

- Patients with high infection risk.
- Those with limited venous access or prior lead complications.
- Post-device infection re-implantation cases.
- Young women concerned about cosmetic outcomes.

Indian women EPs are leveraging these criteria to personalize therapy, especially in resource-constrained settings where minimizing complications is critical.

Future Trends in Leadless Pacing

The future of leadless pacing is promising, with ongoing developments in:

- Dual- chamber and multi- site pacing.
- Integration with remote monitoring platforms.
- Expanded indications, including heart failure and atrial fibrillation.
- Cost reduction strategies to improve accessibility in low- and middle- income countries.
- Conduction system pacing Capability with leadless pacemaker.

Indian women in EP are advocating for inclusive training, localized data registries, and industry collaboration to accelerate adoption and innovation.

Conclusion

Leadless pacemakers are revolutionizing cardiac pacing, offering safer, more efficient solutions for diverse patient populations. Indian women electrophysiologists are not only embracing this technology—they are shaping its clinical trajectory. Their contributions underscore the importance of diversity in medical innovation and signal a future where leadership in EP is truly without strings attached.

GETTING TO KNOW: PROF HUNG-FAT TSE

*APHRS 1st Secretary General 2025
Department of Medicine, The University of Hong Kong*



Can you talk about an accomplishment that you are particularly proud of?

One accomplishment I'm particularly proud of is my research in the field of cardiac pacing. I've contributed to early work on innovative approaches such as biological pacemakers, ultrasound-induced pacing, and the development of leadless pacemakers. These efforts have helped explore novel and less invasive methods of pacing, and I continue to be involved in clinical trials that advance this area. It's rewarding to contribute to developments that have the potential to shape the future of cardiac care.

Why did you choose to enter medicine and above all, prefer to specialize in Electrophysiology?

I developed an early passion during high school. A personal experience of being admitted to the hospital and observing the doctors work left a lasting impression on me and inspired my interest in the field. My interest in electrophysiology began under the mentorship of Professor CP Lau, a specialist in pacing and EP. I started my training in pacing, which naturally progressed into electrophysiology. Although I trained in other areas of cardiology, this path felt like the right fit.

What do you regard as the most significant development in Electrophysiology in the recent past?

I would highlight two key developments. In catheter ablation, pulsed field ablation (PFA) has emerged as a major breakthrough for managing atrial fibrillation. I was initially skeptical when reviewing early studies, but the technology has since matured significantly, offering improved efficacy and safety. In pacing, conduction system pacing is another exciting advancement. I was involved in early work exploring alternative pacing sites, and with new leads now available, this approach is becoming much more viable and impactful.

If you could have an alternative career, what would it be and why?

If I had pursued an alternative career, I would likely have become a surgeon. During my training, I was deciding between head and neck or plastic surgery and cardiology. I was very close to choosing surgery, but ultimately, I decided to follow the path of internal medicine, which led me to where I am today.

Who has inspired you the most in your life and why?

My greatest inspiration has been my mentor, Professor C.P. Lau. He was the first physician I worked with when I joined the medical department, and he played a key role in guiding me toward cardiology. Although I initially considered hematology, working with Professor Lau during my first rotation sparked my interest in research and clinical work in electrophysiology. His mentorship has had a significant impact on both my training and career development.

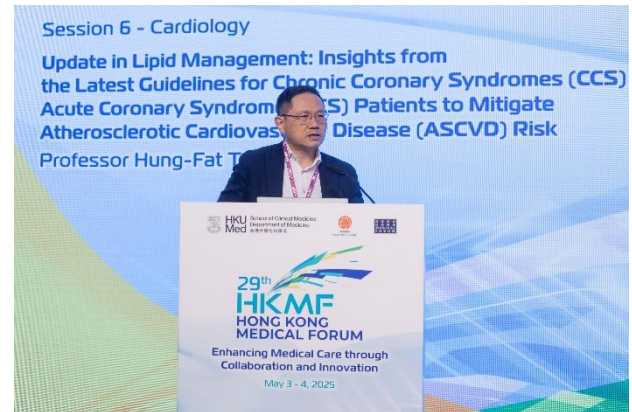
What are your hobbies and interests outside of medicine?

Outside of medicine, I used to enjoy water sports and basketball, but after injuring my knee, I had to stop playing. These days, I mainly focus on going to the gym and staying active through regular exercise. My son is a personal trainer, so I also do physical training with him from time to time—which has become a unique and enjoyable part of my routine.



Favourite weekend activity?

My favourite weekend activity is spending quality time with my family, especially having dinner together. During the week, it's hard to find time to sit down with my wife and kids, so weekends are special for that. We used to go to the gym and train together, but lately, it's been difficult to coordinate.



What is the funniest thing that has happened to you recently?

One of the most memorable and amusing recent experiences was a family trip to Norway to celebrate my son's graduation from medical school. We even ventured toward the North Pole, which made it a truly unique journey. It was heartwarming and a bit funny to travel together as a family—especially knowing it might be one of the last big trips we take before my son starts his busy life as a doctor.

What is your best life advice, motto or favorite quote?

My best life advice is to stay persistent and follow your passion. Whatever path you choose, it's important to stay focused and committed. Even if you start small, consistency and passion will carry you forward. That's what has kept me going in both my career and academic life.

What are your thoughts about some of the emerging technologies, and the way they will shape the future care of arrhythmia patients?

I believe AI will play a crucial role in the future care of arrhythmia patients. In electrophysiology labs, AI could assist in guiding ablation procedures, improving diagnosis, and personalizing treatment beyond just relying on experience. Another major area is gene and cell therapy, which offers new hope for treating diseases that were previously incurable. It's important for the next generation of physicians to stay updated and embrace these emerging technologies to advance patient care.

EP LAB SPOTLIGHT: CALMETTE HOSPITAL'S JOURNEY IN CARDIAC INNOVATION

Written by: Sorkhan Sok, MD

Introduction

The Electrophysiology (EP) Lab at Calmette Hospital has been a cornerstone of cardiovascular care, pioneering advancements in the diagnosis and treatment of cardiac arrhythmias. From its early days to its current state-of-the-art facility, the lab has played a vital role in shaping electrophysiology practices in Cambodia. In this spotlight, we explore its history, present achievements, and future directions.

The History of Calmette's EP Lab

Founded in 1958 as a French Polyclinic, Calmette Hospital endured significant devastation during the Khmer Rouge era. After reopening in the early 1980s, it has developed into a national referral centre, backed by the Cambodian government and international partners. The Cardiology department was established in November 2001 (Phnom Penh Heart Center), by a French couple, Mr. and Mrs. Le Petit.



Figure 1. (Left) Calmette Hospital (in Phnom Penh, the capital of Cambodia) features a new building along with another (under construction) in the centre of the hospital. (Right) Cardiology Department

In 2003, the first implantation of a monochamber pacemaker was performed by Prof. Chour Sok (Interventional Cardiologist), the former head of the Cardiology department and president of the Cambodian Heart Association, alongside Prof. Xavier Jouven (former electrophysiologist at the European Hospital Georges Pompidou, Paris, France). And in 2010, the first radio-frequency catheter ablation for AVRT was performed by our EP, alongside Dr. William Choe (EP from Denver, Colorado, USA) with support from Jeremiah's Hope.

Present: A Centre for Advanced Arrhythmia Treatment

We operate two CathLabs: one dedicated to interventional cardiology and the other for electrophysiology. Our department is staffed with five EPs, including three who completed their fellowships in France, one from Indonesia, and one from South Korea, all of whom are qualified to implant devices and perform radiofrequency catheter ablations. Additionally, Six CathLab nurses are available to assist us during procedures.



Figure 2. (Upper left) Pacemaker implantation by Dr. Sorkhan SOK (me) with EP fellow. (Upper right) Pacemaker implantation by Dr. Channy Kea with me. (Bottom left) Catheter ablation of typical atrial flutter. (Bottom right) EP nurse with EP-4 cardiac stimulator.

The number of cases involving devices (such as pacemakers, ICDs and CRT-Ps) and of ablation (AVNRT, AVRT, atrial flutter, RVOT PVC/VT, etc.) has risen each year.

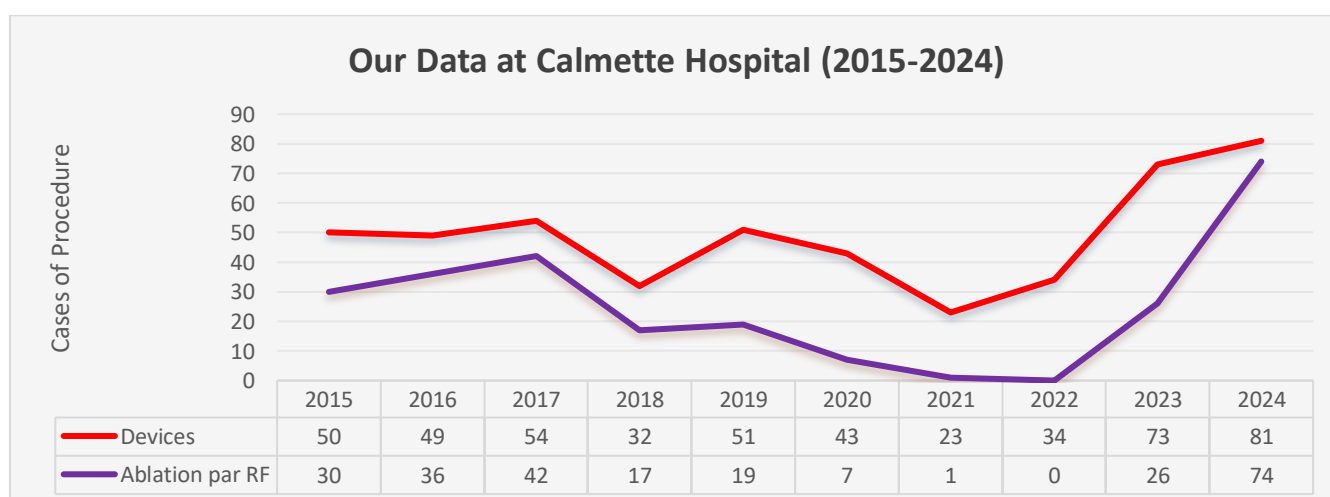


Figure 3. Our data of the EP procedure at Calmette Hospital (2015-2024) (Note: a decrease during 2021-2022 due to the Covid-19 in Cambodia).

To assist our EP lab, the American EP team (Jeremiah's Hope) (Prof. Melvin Scheiman, Dr. Sundaram Sri, Dr William Choe, with other electrophysiologists, nurses, and technicians) and the Korean EP team supported by the Korean Heart Rhythm Society (KHRS) (Dr. Chun Hwang, senior member of KHRS, Prof Hui-Nam Pak, the current president of the Asia Pacific Heart Rhythm Society (APHRS), and other EPs, nurses, and technicians)

frequently visit our EP lab to provide support and training for our EP doctors and nurses in performing both simple and complex ablation procedures and in implanting devices.

In January 2024, our first leadless pacemaker (Micra VR) was successfully implanted by our Calmette and American EP team. Then, in mid-2024, the first catheter ablation case using the 3D mapping system (for RVOT PVC) was carried out by our Calmette and Korean EP doctors, thanks to the 3D Mapping Ensite System donated by KHRS in collaboration.



Figure 4. Leadless pacemaker implantation by Dr. Jonathan Dukes (EP from San Francisco, CA, USA) (middle) with our Cambodian EP (Dr. Sorkhan Sok and Dr. Chandara Rith) and nurses.



Figure 5. (Upper) Catheter ablation of RVOT VT by 3D Mapping guided by Dr. Joseph A. Donnelly (EP from Asheville, NC, USA) with technician and our EP. (Lower left) Catheter ablation of typical AVNRT guided by A/Prof. Sabrina Tsao (Paediatric EP from Hong Kong) and Dr. Marc Lahiri (EP from Detroit, Michigan, USA). (Lower right) Catheter ablation of left side AP guided by Dr. Chun Hwang with Prof. Hui-Nam Pak's team and our EPs (Dr. Chhayroud Heng and Dr. Chandara Rith).

Future Outlook: The Upcoming Frontier in Cardiac Electrophysiology

We will have two additional CathLabs in the new building (under construction) within the next 2-3 years, due to the rise in the number of cases and activities in our lab.

In terms of devices, our upcoming plan is to perform His bundle pacing (HBP) or left bundle branch area pacing (LBBAP) for conduction system pacing (CSP), and we will soon introduce the implantable loop recorder (ILR) in our lab to monitor certain tachy-arrhythmias (Ex.: paroxysmal atrial fibrillation) to reduce the risk of ischemic stroke and to address some brady-arrhythmias for recurrent unexplained syncope.

For ablation procedures, our next step will involve handling complex cases (e.g., pulmonary vein isolation for atrial fibrillation, ischemic VT, etc.) to advance our electrophysiology program and establish our EP centre as the premier facility in the country.

Currently, we are providing training to our EP fellows (Cardiology residents and early-career cardiologists) for the next generation, while also equipping our nurses with the necessary skills to assist in case procedures. However, a significant challenge we face is the lack of a technician, which hampers our ability to manage 3D mapping for complex cases and troubleshoot device issues. Therefore, our next step is to enable our nurses to pursue further education abroad, focusing on acquiring the skills needed to perform roles similar to those of a technician, particularly in the Southeast Asia or Asia-Pacific regions.

Conclusion

Starting from its modest origins, the Calmette EP Lab has evolved into a frontrunner in arrhythmia treatment, continuously expanding the limits of cardiac electrophysiology. Built on a solid base, it is planning future initiatives through partnerships with global collaborators, ensuring it stays at the leading edge of tailored, cutting-edge, and easily accessible heart rhythm management.



Figure 6. Prof. Chour Sok (former head of department and president of Cambodian Heart Association), A/Prof. Sokha Chan (Current head of Department), interventional cardiologists, electrophysiologists and CathLab nurses.



"We put forth our utmost effort to advance electrophysiology, not only in Cambodia but also throughout the region and on the international platform. Let's wait and see what unfolds in the next decade" stated Dr. Sorkhan Sok, Electrophysiologist.

THE PFA FRONTIER: HOW DO WE MOVE FROM INNOVATION TO INTEGRATION?

Written by: Hideharu Shimizu, M.D., Ph.D.
Chief Medical Officer, Johnson & Johnson MedTech Japan



A transformational opportunity guided by evidence

Pulsed Field Ablation (PFA) is advancing electrophysiology, offering greater precision when used with 3D electroanatomical cardiac mapping technology, shorter procedure times, and theoretically reduced thermal risks. Early adoption, particularly in Asia Pacific markets, has demonstrated its clinical promise.

The question before us today is no longer whether PFA will play a role in atrial fibrillation (AF) therapy, but how we responsibly and effectively integrate it into clinical practice. The answer lies in building robust evidence, integrating precision tools into workflows, and collaborating to set safety and efficacy standards. While acute success rates and complication profiles are encouraging, realizing its full benefits requires long-term data – from lesion durability to performance in complex cases – and practical clinician support.

Real-world clinical insights: Navigating early experience

A critical first step is harnessing early clinical experience to refine procedural approaches and prepare clinicians for confident adoption.

- Trials such as **admIRE** (74.6% efficacy¹, 2.9% primary adverse events²) and **inspire** (75.6% efficacy³, zero primary adverse events⁴) validate early optimism.
- Real-world data from the **VARIPURE registry**, most recently presented at *Heart Rhythm 2025*, indicate encouraging safety outcomes across diverse operators⁵.
- The **VARIPULSE program**, now encompassing more than 10,000 global cases, consistently demonstrates low complication rates within established guidelines.
- **Optimized workflows with VARIPULSE** have achieved zero fluoroscopy in 25% of cases², and an average fluoroscopy time of under eight minutes² when required.
- When **deep sedation** was used in fewer than 30% of cases in the inspire study, patient satisfaction was 100% with no complications reported⁶.

Clinical evidence: Essential for safe and effective adoption

Moving PFA from promising innovation to standard practice demands comprehensive evidence and clinician education. Early procedural refinements in the US, such as increased irrigation flow (30 mL/min)⁷, have been integrated into clinical practice to further improve safety profiles.

Ongoing studies would optimize ablation strategies, balancing efficacy with safety and refining protocols to manage emerging risks. Through active partnerships with electrophysiologists and academic

¹ ClinicalTrials.gov. Assessment of Safety and Effectiveness in Treatment Management of Atrial Fibrillation with the BWI IRE Ablation System (AdmIRE). NCT05293639.

² Reddy VY, et al. *Circulation*. 2024;150(15):1174-1186.

³ De Potter, Tom, et al. *Circulation: Arrhythmia and Electrophysiology*. 2024;17(5):e012667.

⁴ Duytschaever, Mattias, et al. *Circulation: Arrhythmia and Electrophysiology*. 2023;16(3):e011780.

⁵ Bessiere, Francis, et al. *Heart Rhythm*. 2025;22(4):S797.

⁶ Grimaldi M, et al. *Eurospace*. 2023;25(9):eoad222.

⁷ Sauer, et al. Irrigation of Pulsed Field Ablation Electrodes Mitigates Joule Heating and Heat Stacking Phenomena. *JACC*. 2025.

Regulatory approval status for 30 mL/min irrigation during ablation for VARIPULSE catheter varies by country. Please follow the approved directions for use in your country.

societies, we continue to proactively identify complications, refine best practices, and improve patient outcomes.

With this growing body of evidence as our foundation, the next priority is integrating PFA into clinical workflows so its benefits can be realized consistently.

Integration helps unlock precision in practice

Integrating with mapping technologies like CARTO enhances procedural precision and outcomes. 3D mapping enables the labeling of every PFA application, achieving near-complete correlation between ablation tags and post-ablation low-voltage areas⁸.

CARTO's integrated mapping improves catheter-tissue contact, lesion depth⁹, transmural¹⁰, and durability¹¹. For patients, these results suggest meaningful impact: 90% remain asymptomatic one year post-procedure², with AFEQT scores improving by 32 points².

An Integrated VARIPULSE™ Platform and optimized workflow

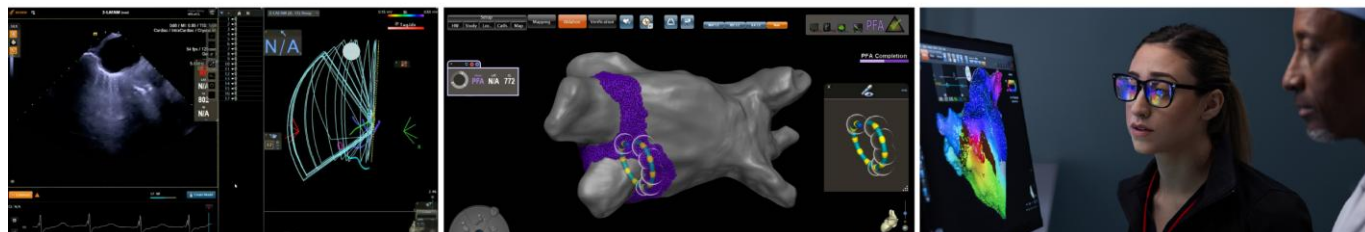
Create
CARTOSOUND™
FAM Module shell

Use CARTO VIZIGO™
Sheath and TPI to position
VARIPULSE™ Catheter

Mark ablation
locations with
VISITAG™ Module grid

Use grid
overlay to
assist with PVI

Partner with
clinical expert to
assess lesions



Collaboration defines the future of clinical excellence

Realizing PFA's full clinical potential demands rigorous clinical research and robust evidence, built collaboratively. Johnson & Johnson MedTech actively partners with clinicians and academic societies to address procedural challenges, optimize workflows, and establish clinical best practices.

We look forward to a pivotal opportunity to share insights, deepen evidence, and define the future standards of AF treatment. Great technology requires great evidence and practical integration. Our commitment to collaboration across the community of electrophysiologists is essential for ensuring safe, precise, and impactful care, while contributing to healthier and happier lives in the era of the 100-year life.

Johnson & Johnson
MedTech

⁸ Fink T, et al. Pacing Clin Electrophysio. 2025;48(5):471-479.

⁹ Okumura Y, et al. Heart Rhythm. 2025;22(4):952-960.

¹⁰ Di Biase L, et al. Europace. 2024;26(9):euea220.

¹¹ Seemala, Sai Krishna Reddy, et al. Heart Rhythm. 2025;22(4): S79-S80.

APHRS2025

JHRS2025

Is this what Yokohama is like?

Yokohama is located approximately 35km west of Tokyo.
Yokohama is known as one of the leading port cities in Japan
and has many tourist attractions.

Some of the tourist attractions include the night view of Minato Mirai 21,
Yamashita Park, Yokohama Chinatown, Hakkeijima Sea Paradise (aquarium),
and the Shin-Yokohama Ramen Museum.

Enjoy Yokohama during JHRS2025/APHRS2025.

Early Bird Registration: From the end of August to the end of September, 2025

Registration categories for APHRS member		Registration fee	Note
APHRS member: Doctor / Researcher *covers all 4days	Early Bird	¥45,000	*untaxable
	Standard	¥50,000	*untaxable
APHRS member: Nurses, Allied professionals *covers all 4days		¥15,000	*untaxable
APHRS member: Nurses, Allied professionals *Day 1: Nov. 12 only		¥6,000	*untaxable
APHRS member: Nurses, Allied professionals *Day 2: Nov. 13 only		¥6,000	*untaxable
APHRS member: Nurses, Allied professionals *Day 3: Nov. 14 only		¥6,000	*untaxable
APHRS member: Nurses, Allied professionals *Day 4: Nov. 15 only		¥6,000	*untaxable
APHRS member: Sales representative (Non-Medical Doctors, Non-Researchers) *covers all 4days		¥22,000	*untaxable

Registration categories for APHRS Non-member		Registration fee	Note
APHRS Non-member: Doctor / Researcher *covers all 4days	Early Bird	¥80,000	*10% tax included
	Standard	¥90,000	*10% tax included
APHRS Non-member: Nurses, Allied professionals *covers all 4days		¥18,000	*10% tax included
APHRS Non-member: Nurses, Allied professionals *Day 1: Nov. 12 only		¥6,600	*10% tax included
APHRS Non-member: Nurses, Allied professionals *Day 2: Nov. 13 only		¥6,600	*10% tax included
APHRS Non-member: Nurses, Allied professionals *Day 3: Nov. 14 only		¥6,600	*10% tax included
APHRS Non-member: Nurses, Allied professionals *Day 4: Nov. 15 only		¥6,600	*10% tax included
APHRS Non-member: Sales representative (Non-Medical Doctors, Non-Researchers) *covers all 4days		¥40,000	*10% tax included
Students		Free	