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ACTIVITY REPORT: ELECTROPHYSIOLOGY AND PACING IMMERSION PROGRAM AT THE ROYAL ADELAIDE HOSPITAL'S CARDIOLOGY DEPARTMENT

Written by: Giky Karwiky, M.D.

My name is Giky Karwiky, M.D. I work as a cardiac electrophysiologist at Hasan Sadikin General Hospital in Bandung, Indonesia. I had the opportunity to take part in the Immersion Program, which is supported by APHS endorsed by Prof Yoga Yuniadi, MD. This report details my recent immersion program experience in the Royal Adelaide Hospital's electrophysiology and pacing department, which took place from September 30 to October 20, 2024. During this time, I had the chance to collaborate closely with Prof. Prashanthan Sanders, a world-renowned expert in electrophysiology and pacing, particularly in the study and management of atrial fibrillation, as well as other hospital electrophysiology consultants.



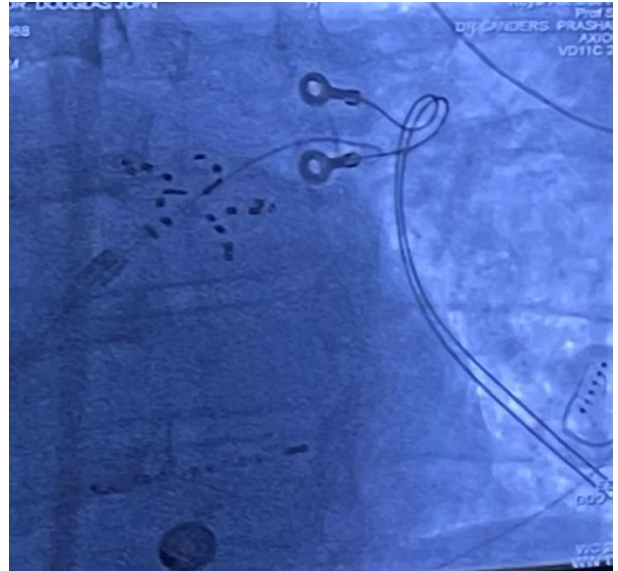
The immersion program's objectives included getting experience as an observer in electrophysiological procedures during a three-week period. On the first day, I had the opportunity to attend an intracardiac echocardiography (ICE) workshop with Dr. Mansour Razminia from the United States. This is an extremely great opportunity to not only grasp ICE as a diagnostic technique, but also to better visualize catheter manipulations during electrophysiological procedure. Dr. Mansour is an expert with a passion for teaching and simplifying complex concepts.

The following week, we observed the most recent electrophysiology procedures, particularly atrial fibrillation ablation with pulsed field ablation technology and various different approach techniques used by each consultant, all of which enriched our understanding of how to select an effective strategy for each individual while minimizing complications. We also saw a variety of electrophysiology procedures, such as conventional flutter ablation, CRT-D, Left Bundle Branch Area Pacing, SVT ablation, AV nodal ablation, and other EP treatments. I attended team meetings and focused on individual problem management. Participating in pre-procedural planning and post-procedural care. I discussed patient management plans with the clinical team.



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I am interested in patient safety measures implemented during procedures that I may use in the future with the goal of achieving zero complications, such as puncture with USG guidance to avoid vascular problems and transeptal puncture with TEE guidance. We also participated in a scientific discussion led by Prof. Sanders and his team, which covered the most recent technology, particularly for better and earlier arrhythmia detection.



Throughout this program, I took advantage of networking opportunities with fellow electrophysiologists. I met fellows and electrophysiologists under Prof. Sanders from various regions. I was impressed by this international relationship which made it possible to establish connections with healthcare professionals in the field, fostering collaboration. This program was quite helpful in expanding my knowledge of how EP procedures are conducted in different countries, and I truly enjoyed it. Since atrial fibrillation ablation is currently too expensive in underdeveloped nations, I hope that the techniques can be equally distributed throughout all APHRS countries, including Indonesia. I sincerely appreciate Prof. Yoga Yuniadi for providing me with this invaluable opportunity. Additionally, we are grateful to Prof. Sanders for his kind hospitality as well as the experience and knowledge he shared.



GETTING TO KNOW: DONG SEOP JEONG, MD PhD

*APHRS Surgery Committee Chair 2025
Samsung Medical Center Seoul, South Korea*

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

I've been very interested in the heart since I was young, especially curious about arrhythmias.

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

Pulsed field ablation.

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

I specialize in arrhythmia surgery and am currently among the top in the world in terms of clinical outcomes and number of thoracoscopic arrhythmia surgeries. It took about 10 years to reach this level. I performed my first surgery in February 2012.



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

If I had chosen a different field, I think I would have studied the basic science of arrhythmias. I've felt the limitations of current treatments. It's perplexing to see patients whose arrhythmias recur even without electrical abnormalities.



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

My father.

What are your hobbies and interests outside of medicine?

Major: piano and guitar.

Sports: Volley ball (my wife was the professional volleyball player!).



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

An elderly patient over 80 years old requested treatment for atrial fibrillation, so I restored his normal rhythm through thoracoscopic arrhythmia surgery and discontinued his medication. However, his wife came to me, upset, asking why I treated him. She complained that since his atrial fibrillation was gone and he could take Viagra without issues, he started having affairs.

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

Life that does not move is dead.



What advice would you give to your younger self?

Life that does not move is dead.

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

The concept of pulsed field ablation (PFA) is indeed very progressive, and it's great to hear that you're considering applying it in your thoracoscopic arrhythmia surgeries. However, because PFA can create extensive lesions, complementary developments are necessary to mitigate this. Particular caution is needed regarding potential coronary artery damage, which can be life-threatening. Your forward-thinking approach in seeking ways to improve and adapt new technologies while considering their risks highlights the complex balance required in advancing cardiac care.

If you were a movie character, who would you be and why?

Spiderman, a hero who is most human, adaptable, and perhaps the most realistic.

You're a new addition to the crayon box. What color would you be and why?

The color beige often evokes a sense of peace and can attract attention due to its warm yet neutral appearance, making it an excellent choice for creating a calm and noticeable visual impression.

How do you keep a healthy work/life balance?

10 km running (week day).

Volley ball (Sunday).

Piano (2-3 competition a year, Debussy is my favorite).

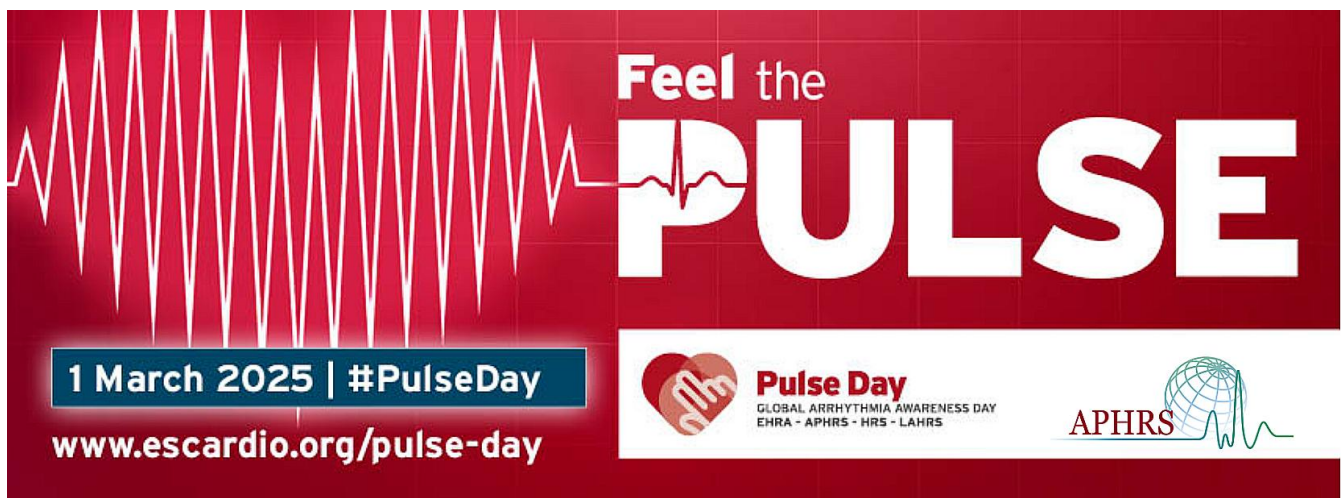


Favorite weekend activity?

Volley ball.

PULSE DAY: A GLOBAL INITIATIVE FOR ARRHYTHMIA AWARENESS

Written by: Dicky Hanafy, MD, PhD



Introduction


Heart rhythm disorders, or arrhythmias, affect millions of people worldwide, often leading to severe complications such as stroke, heart failure, and even sudden cardiac death. Despite their prevalence, arrhythmias remain underdiagnosed and misunderstood, primarily due to subtle symptoms and a lack of public awareness. In response to this global health challenge, the **European Heart Rhythm Association (EHRA)**, established "**Pulse Day**", also known as "**Global Arrhythmia Awareness Day**". The inaugural Pulse Day is scheduled for March 1, aligning with the statistic that approximately one-third of the global population may develop a serious arrhythmia, symbolized by the date 1/3 (1 March). This annual event aims to educate the public, promote early detection, and advocate for better care for individuals living with arrhythmias. Through global collaboration and community engagement, Pulse Day has become a cornerstone in the fight against heart rhythm disorders.

The Significance of Pulse Day

Pulse Day is more than just a day of awareness; it is a call to action. Arrhythmias, such as atrial fibrillation (AFib), are often referred to as "silent killers" because they can go unnoticed until a serious complication arises. By encouraging individuals to check their pulse regularly, Pulse Day empowers people to take control of their heart health. A simple pulse check can reveal irregularities that may indicate an underlying arrhythmia, prompting timely medical intervention.



The day also serves as a platform to educate the public about the symptoms, risks, and treatment options for arrhythmias. Symptoms such as palpitations, dizziness, shortness of breath, and fatigue are often overlooked or attributed to other causes. Pulse Day highlights the importance of recognizing these signs and seeking medical advice. Additionally, the initiative emphasizes the role of lifestyle changes, such as maintaining a healthy diet, exercising regularly, and managing stress, in preventing arrhythmias.



1 in 3
of us is
at risk of a
serious arrhythmia.
Tune into the signs
and take action

1 March 2025 | #PulseDay

Feel the
PULSE

www.escardio.org/pulse-day



Global Collaboration: Uniting for a Common Cause

One of the most remarkable aspects of Pulse Day is its global reach, achieved through collaboration with leading arrhythmia societies worldwide. The **Asia Pacific Heart Rhythm Society (APHRS)**, the **Heart Rhythm Society (HRS)**, and the **Latin American Heart Rhythm Society (LAHRS)** have joined forces with EHRA to amplify the impact of Pulse Day. This partnership brings together expertise and resources from Europe, Asia-Pacific, North America, and Latin America, creating a unified front against arrhythmias.

The collaboration enables:


1. **Shared Expertise:** Combining knowledge and best practices from different regions to improve arrhythmia care worldwide.
2. **Global Awareness Campaigns:** Coordinated efforts to educate the public through social media, webinars, and community events.
3. **Multilingual Resources:** Development of educational materials in multiple languages to ensure accessibility across diverse populations.
4. **Advocacy and Research:** Joint efforts to advocate for better arrhythmia care policies and support research initiatives to advance treatment options.

Social Media Campaign Competition

How to Participate:

1. Create and share content promoting Pulse Day on social media (Instagram, Facebook, X, LinkedIn, etc.) using **#PulseDay**
2. Content can be a **PPT (max 3 slides)** or a **1-minute video**.
3. Upload your submission via the **EHRA Website (submission link available on the homepage)**.

Judging Criteria: Engagement, reach, total likes, shares, comments, and number of times **#PulseDay** is used.

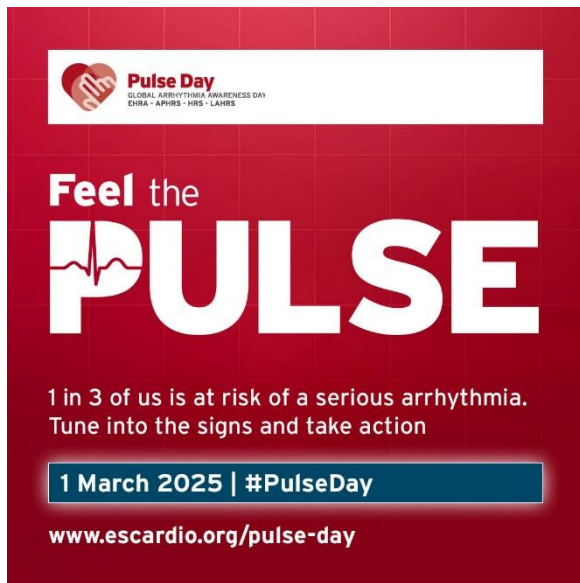


Feel the
PULSE

1 in 3 of us is at risk of a
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Local Events Competition

How to Participate:

Organise a **local Pulse Day event** targeting the general public, healthcare professionals, or media.

Judging Criteria: Attendance, audience feedback, and media coverage.

These two competitions are your chance to showcase your creativity and stand to win an **exclusive travel grant and complimentary attendance to the EHRA Summit!**

All competition materials should be submitted via the official EHRA website or the Excel Sharepoint:

[EHRA Website](#)

[Excel Sharepoint](#)

The Future Impact of Pulse Day

As **Pulse Day** continues to grow, its potential to drive meaningful change in global cardiovascular health is immense. By raising awareness and promoting early detection, the initiative can reduce the incidence of stroke and other complications associated with arrhythmias. Increased public knowledge about heart rhythm disorders can lead to earlier diagnosis and intervention, improving patient outcomes and quality of life.

Moreover, **Pulse Day's** emphasis on global collaboration and advocacy can help address disparities in arrhythmia care, particularly in low- and middle-income countries. By advocating for better healthcare policies and resources, the initiative can ensure that individuals worldwide have access to the care they need. The ongoing support for research and innovation will also pave the way for new treatments and technologies, further advancing the field of arrhythmia management.

Conclusion

Pulse Day is a powerful reminder of the importance of heart health and the role that each individual can play in preventing and managing arrhythmias. Through its global collaboration, educational initiatives, and advocacy efforts, Pulse Day has become a beacon of hope for millions of people living with heart rhythm disorders. As the initiative continues to expand, its impact on global cardiovascular health will undoubtedly grow, saving lives and improving the quality of life for individuals worldwide. **Pulse Day** is not just a day of awareness; it is a movement towards a healthier, more informed world.

TRISCUPID VALVE REGURGITATION AFTER LEFT BUNDLE BRANCH AREA PACING LEAD IMPLANTATION

Reviewed by: Pitawat Saesue, MD⁽¹⁾, Chayapol Limtrakul, MD⁽¹⁾, Napawan Pornnimitthum, RN, CCDS⁽²⁾, Assoc. Prof. Arisara Suwanagool, MD, FESC⁽¹⁾

¹Division of Cardiology, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand

²Her Majesty Cardiac Center, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand

Introduction

Tricuspid regurgitation (TR) related to cardiac implantable electronic devices (CIED) is a well-known complication, particularly following right ventricular (RV) lead implantation. The mechanisms behind TR include mechanical interference with the tricuspid valve caused by the lead. This can occur through lead impingement (affecting the mobility of the valve leaflets), adherence of the lead to the valve leaflets, leaflet perforation (often involving the septal leaflet), entanglement of the lead with the subvalvular apparatus, and pacing-induced dyssynchrony.⁽¹⁻²⁾ Left bundle branch area pacing (LBBAP) has emerged as a promising alternative to traditional pacing techniques, as it provides improved physiological activation of the ventricles. However, there have been reports of complications associated with LBBAP (Table 1), raising concerns about its potential to exacerbate tricuspid regurgitation.

Table 1 Complications with left bundle branch area pacing and their incidences

Per-operative complications	Post-operative complications
Septal perforation (0.0–14.1%)	Delayed septal perforation (0.1–0.3%)
Right bundle branch block (19.9% with 6.3% permanent)	Worsening tricuspid regurgitation (7.3–32.6%)
Complete heart block (9.4% acute with 2.6% permanent)	Lead dislodgment (0.3–1.5%)
Intra-operative lead dislodgment (3.0%)	Rise in threshold by >1 V (0.3–1.8%)
Acute coronary syndrome (0.4–0.7%)	Loss of LBB capture (0.3–11.5%)
Coronary artery fistula (1.4–2.0%)	
Coronary vein fistula/injury	
Septal hematoma	
Helix damage/fracture (0.8–5.0%)	

Adapted from EHRA clinical consensus statement on conduction system pacing implantation 2023⁴

Incidence

In conventional right ventricular (RV) pacing, the pooled incidence of worsening tricuspid regurgitation (TR) is reported to be 24%⁽¹⁾. Additionally, various studies have shown a connection between worsening TR and increased mortality as well as higher rates of heart failure hospitalization^(1,2). In contrast, data related to left bundle branch area pacing (LBBAP) and its impact on TR is still limited. Some studies have indicated a rise in the incidence of worsening TR following LBBAP. A recent meta-analysis involving 1,555 patients found that the incidence of worsening TR within one year after LBBAP is approximately 8%, which increases to 23% after one year. This rate is comparable to that observed with conventional RV pacing.

Impact of LBBAP on tricuspid valve regurgitation

Observational studies have shown that Left Bundle Branch Area Pacing (LBBAP) can improve right ventricular (RV) function^(5,7-8) and may reduce the risk of tricuspid regurgitation (TR) progression⁽⁸⁾. In a cohort of 638 patients followed for one year, TR improved in 31.4% of cases, remained unchanged in 44.3%, and worsened in only 12.4% of cases, with no echocardiographic evidence of valvular injury present.

A cohort study of 608 patients over two years found that left bundle branch area pacing (LBBAP) significantly increases the risk of tricuspid regurgitation (TR) deterioration, with a rate of 14.5% ⁽²⁾ and an odds ratio of 2.59 (95% CI: 1.51-4.44, p=0.001) compared to overall right ventricular pacing ⁽²⁾. Factors associated with worsening TR, defined as an increase of at least one grade, include atrial fibrillation (AF) as a risk factor and a lead-to-tricuspid annulus (lead-TA) distance greater than 20 mm as a preventive factor (Table 2). While other studies have reported inconsistent findings (Table 3), a recent meta-analysis noted significant heterogeneity in results ⁽³⁾. It also indicated that a longer lead-TA distance (greater than 19.9 mm) is linked to a lower risk of TR worsening, with an adjusted odds ratio of 0.59 (95% CI: 0.36–0.96; p = .034), as shown in Figures 1 and 2.

Table 2 Factors associated progression of TR in LBBAP cohort

Per-operative complications	Hazard ratio (95% CI)	P-value
Age (years)	1.02 (0.99-1.06)	0.196
Female	1.78 (0.79-3.97)	0.152
Atrial fibrillation	4.68 (2.12-10.33)	<0.001
Ventricular pacing > 40%	0.51 (0.23-1.10)	0.091
Lead-TV distance	0.86 (0.76-0.97)	0.009

Adapted from Li X, et al. (2023)²

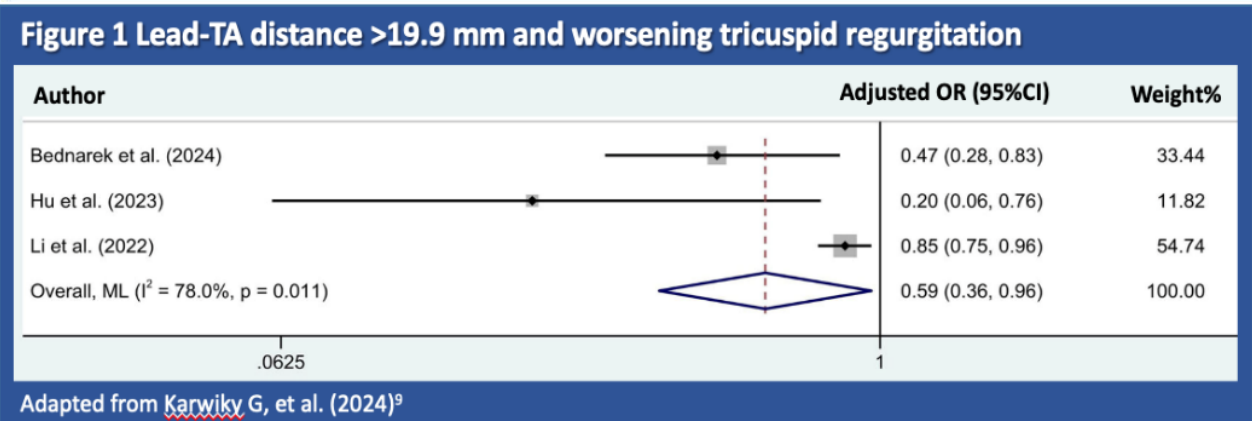


Table 3: Studies of Left bundle branch area pacing and worsening tricuspid regurgitation						
Authors	Year	Region	Study Patients	Population	Follow-up (months)	Outcomes
Bednarek, et al. ⁷	2024	Poland	Any indication for permanent pacing due to bradycardia	122 LBBAP	21	TR deterioration 13.9%
Mao, et al. ⁶	2023	China	SSS, AVB, AF with slow heart rate patients	45 LBBAP vs. 33 RVP	12	no significant TR in LBBP vs. significant worsening TR in RVSP group
Palmisano P, et al. ¹²	2024	Italy	Patients who had indication for CRT	107 LBBAP vs. 561 BiVP	18	TR progression 6.5% in LBBAP similar to BiVP
Li, et al. ²	2022	China	According to AHA/ACC/HRS Guidelines	269 LBBAP vs 203 RVP	24	TR progression 14.5% in LBBAP vs 13% in vs 5.9% in RVSP (P= 0.004)
Hu, et al. ¹¹	2022	China	According to AHA/ACC/HRS Guidelines	89 LBBAP	19	32.6% has TR progression
Su, et al. ⁸	2021	China	With an indication for treatment of bradycardia or cardiac resynchronization therapy.	618 LBBAP	12	TR improvement 31.4%, but worsening TR 11.1%

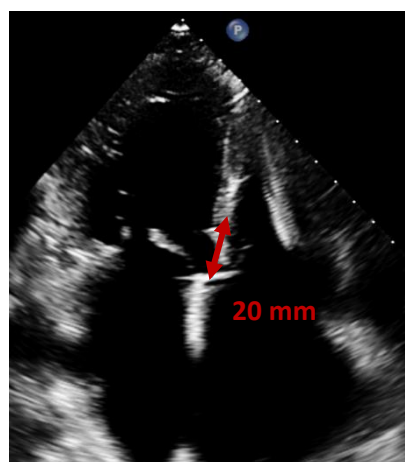


Figure 2: the measurement method of lead-TA distance according to Karwicky G, et al.(2024)⁹

Anatomical Considerations and Mechanism

The tricuspid valve is a complex structure made up of leaflets, chordae tendineae, papillary muscles, and the myocardium of the right ventricle. During left bundle branch area pacing (LBBAP) lead implantation, after crossing the tricuspid valve, the lead is positioned deep into the interventricular septum, with the entry site located 1-2 cm away from the summit of the tricuspid valve, as illustrated in Figure 3. This position is close to the septal leaflet of the tricuspid valve ⁽²⁾. While LBBAP has the advantage of reducing dyssynchrony, it can still interfere with the tricuspid valve function. During the introduction of the guiding catheter, it is important to keep the lead within the catheter to avoid issues such as screw trapping or entanglement, which can injure the tricuspid valve apparatus ⁽⁴⁾. Additionally, placing the lead too close to the tricuspid valve may impair leaflet coaptation or induce fibrosis, contributing to the development of tricuspid regurgitation (TR) ⁽⁵⁾.

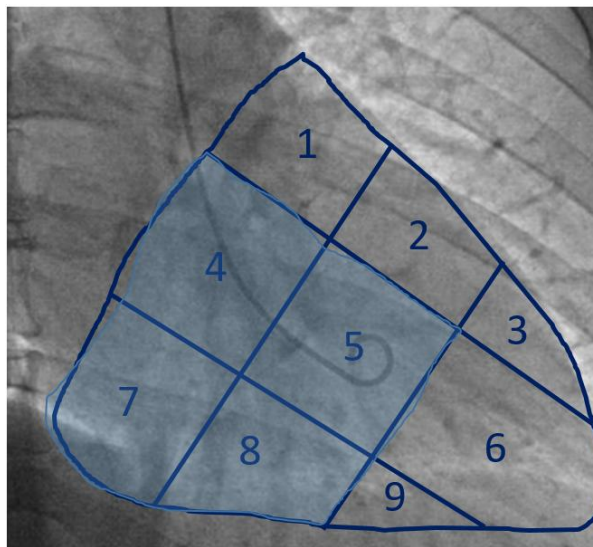


Figure 3: Successful pacing sites can be localized within 4/5/7/8 sectors of 9 partition method¹⁰ which consistent with 15-35 mm away from the triscupid annulus summit and at an angle of 10° to 30°, as described in EHRA clinical consensus statement on conduction system pacing implantation 20234. Adapted from Micheau A, Hoa D, e-Anatomy, www.imaaios.com, DOI: 10.37019/e-anatomy.

Conclusion

Studies have demonstrated a range of outcomes regarding the effect of left bundle branch area pacing (LBBAP) on tricuspid regurgitation (TR). Some patients may experience worsening TR, while others show stability or improvement. This variability is attributed to several factors, including enhancements in right ventricular (RV) function, improved RV synchrony, and potential interference with the tricuspid valve (TV) caused by leaflet coaptation issues or fibrosis.

Current evidence indicates that maintaining a lead-to-tricuspid annulus (TA) distance greater than 19.9 mm may help decrease the risk of TR worsening. To build on this knowledge, further robust studies are essential to deepen our understanding and validate these findings.

References

1. Gelves-Meza J, Lang RM, Valderrama-Achury MD, Zamorano JL, Vargas-Acevedo C, Medina HM, et al. Tricuspid regurgitation related to cardiac Implantable Electronic devices: An Integrative review. *Journal of the American Society of Echocardiography*. 2022 Aug 11;35(11):1107–22. Doi: 10.1016/j.echo.2022.08.004
2. Li X, Fan X, Wang Q, Wang Z, Zhu H, Li H, et al. Tricuspid regurgitation following pacemaker implantation for bradycardia: a two-year study comparing different pacing strategies. *Chinese Medical Journal*. 2023 Aug 31;136(20):2508–10. Doi: 10.1097/cm9.0000000000002825
3. Diaz JC, Duque M, Aristizabal J, Marin J, Niño C, Bastidas O, et al. The emerging role of left bundle branch area pacing for cardiac resynchronisation therapy. *Arrhythmia & Electrophysiology Review*. 2023 Dec 1;12. Doi: 10.15420/aer.2023.15
4. Burri H, Jastrzebski M, Cano Ó, Čurila K, De Pooter J, Huang W, et al. EHRA clinical consensus statement on conduction system pacing implantation: executive summary. Endorsed by the Asia-Pacific Heart Rhythm Society (APHRs), Canadian Heart Rhythm Society (CHRS) and Latin-American Heart Rhythm Society (LAHRS). *EP Europace*. 2023 Apr 15;25(4):1237–48. Doi: 10.1093/europace/euad044
5. Yin L, Wang L, Meng J, Liu Q, Zhang Y, Zhao Y, et al. A systematic review and meta-analysis of the impact of left bundle branch area pacing on right ventricular function. *Frontiers in Cardiovascular Medicine*. 2025 Jan 30;12. Doi: 10.3389/fcvm.2025.1545757
6. Huang X, Lin M, Huang S, Guo J, Li L, Chen S, et al. Impact on right ventricular performance in patients undergoing permanent pacemaker implantation: Left bundle branch pacing versus right ventricular septum pacing. *Journal of Cardiovascular Electrophysiology*. 2022 Sep 20;33(12):2614–24. Doi: 10.1111/jce.15675
7. Bednarek A, Kielbasa G, Moskal P, Ostrowska A, Bednarski A, Sondej T, et al. Left bundle branch area pacing improves right ventricular function and synchrony. *Heart Rhythm*. 2024 May 13;21(11):2234–41. Doi: 10.1016/j.hrthm.2024.05.019
8. Su L, Wang S, Wu S, Xu L, Huang Z, Chen X, et al. Long-Term safety and feasibility of left bundle branch pacing in a large Single-Center study. *Circulation Arrhythmia and Electrophysiology*. 2021 Jan 10;14(2). Doi: 10.1161/circep.120.009261
9. Karwiy G, Kamarullah W, Pranata R, Achmad C, Iqbal M. A meta-analysis of the distance between lead-implanted site and tricuspid valve annulus with postoperative tricuspid regurgitation deterioration in patients with left bundle branch area pacing. *Journal of Cardiovascular Electrophysiology*. 2024 Sep 27; Doi: 10.1111/jce.16444
10. Hua W, Gu M, Niu H, Gold MR. Advances of implantation techniques for conduction system pacing. *JACC Clinical Electrophysiology*. 2022 Nov 30;8(12):1587–98. Doi: 10.1016/j.jacep.2022.09.022
11. Hu Q, You H, Chen K, Dai Y, Lu W, Li Y, et al. Distance between the lead-implanted site and tricuspid valve annulus in patients with left bundle branch pacing: Effects on postoperative tricuspid regurgitation deterioration. *Heart Rhythm*. 2022 Nov 5;20(2):217–23. Doi: 10.1016/j.hrthm.2022.10.027
12. Palmisano P, Dell’Era G, Guerra F, Ammendola E, Ziacchi M, Laffi M, et al. Complications of left bundle branch area pacing compared with biventricular pacing in candidates for resynchronization therapy: Results of a propensity score–matched analysis from a multicenter registry. *Heart Rhythm*. 2024 Feb 28;21(6):874–80. Doi: 10.1016/j.hrthm.2024.02.053

ADVANCING PACING TECHNOLOGY: ENHANCING PATIENT OUTCOMES WITH LEADLESS PACEMAKERS IN MODERN CARDIOLOGY

Reviewed by: Pattawarin Anukrua, MD⁽¹⁾, Chayapol Limtrakul, MD⁽¹⁾, Napawan Pornnimitthum, RN⁽²⁾, Assoc. Prof. Arisara Suwanagool, MD, FESC⁽¹⁾

¹Division of Cardiology, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand

²Her Majesty Cardiac Center, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand

Introduction

A leadless pacemaker is a modern advancement in cardiac pacing that addresses the limitations of traditional pacemakers, which depend on leads to connect the device to the heart. The main advantage of leadless pacemakers is their minimally invasive design and the absence of leads, which are linked to complications such as infections, fractures, and dislodgement.⁽¹⁾ Leadless pacemakers should be considered for patients who have issues with upper extremity venous access or those at high risk for device pocket infections, such as individuals with a history of infections or patients undergoing hemodialysis.⁽²⁾ These devices are particularly beneficial for patients with complex medical conditions, such as those needing valve interventions or those who have experienced lead-related complications. By removing the risks associated with lead placement, leadless pacemakers provide a safer and more effective alternative, ultimately improving the quality of life for patients requiring long-term cardiac pacing.

Case Presentation 1



Figure 1. (A) CXR PA upright (B) CXR Left lateral showed that the patient has a permanent catheter, white solid arrow, and has had a leadless pacemaker implanted;

An 88-year-old male with a history of coronary artery disease, who underwent coronary artery bypass grafting (CABG) in 2014, has end-stage renal disease (ESRD) and is on regular hemodialysis using a permanent catheter placed in the right internal jugular vein. He presented with recurrent episodes of syncope. An electrocardiogram (EKG) revealed atrial fibrillation with a slow ventricular response, showing a heart rate of 30-40 beats per minute. Given his condition, a leadless pacemaker (Micra VR) was considered as a viable option for permanent pacemaker implantation for this patient.

Case Presentation 2



Figure 2. CXR PA upright showed that the patient has dual chamber pacemaker at right side; white solid arrow, and the new leadless pacemaker was implanted; white dashed arrow.

A 96-year-old male patient with complete heart block has a dual-chamber pacemaker implanted on the left side. He has a history of cardiac implantable electronic device (CIED) infection and underwent transvenous lead extraction (TLE) seven years ago, after which a new pacemaker was implanted on the right side.

During a follow-up interrogation, we found that the right ventricular (RV) lead had a high threshold and low lead impedance, indicating a possible subclavian crush. To investigate further, a left subclavian venogram was performed, which revealed subclavian vein obstruction along with collateral venous circulation.

After discussing the treatment options with the patient, who was at high risk for lead extraction, we decided to implant a leadless pacemaker (Micra AV).

Case Presentation 3



Figure 3. (A) Previous CXR AP upright showed patients had single chamber pacemaker and tricuspid and mitral prosthetic valve. (B) CXR PA upright and (C) left lateral after patient underwent transcatheter tricuspid valve replacement, extract the old pacemaker lead with new leadless pacemaker implantation

A 73-year-old female patient with a history of secundum atrial septal defect (ASD) and post-Amplatzer septal occlusion performed in September 2002 presented with multiple comorbidities. She had severe rheumatic mitral stenosis (MS) with moderate mitral regurgitation (MR) and severe tricuspid regurgitation (TR), for which she underwent mitral valve replacement with a mechanical valve (SJ No. 33) and tricuspid valve replacement (Perimount No. 33) in October 2009. The patient had atrial fibrillation and complete heart block, requiring a permanent pacemaker set in VVI mode. She became dependent on the pacemaker, with right ventricular pacing exceeding 99%.

Eighteen years later, she developed dyspnea on exertion and generalized edema. A transthoracic echocardiogram revealed obstruction of the tricuspid prosthesis. This case was challenging due to the presence of a permanent pacemaker and the need for intervention on the tricuspid valve. After a heart team discussion involving an electrophysiologist, an interventionist, and an echocardiography specialist, we performed a transcatheter tricuspid valve replacement and lead extraction during the same procedure. A leadless pacemaker was considered as the permanent pacing solution for this patient.

Our procedure began with the pacemaker lead extraction, followed by the transcatheter valve placement, and concluded with the leadless pacemaker implantation. The operation was successful and without complications.

Discussion

These cases highlight the challenges clinicians encounter when managing patients with complex cardiovascular issues, particularly when valve replacements and the need for a permanent pacemaker are involved. A critical aspect of the third case was the patient's dependence on the pacemaker, which complicated the decision to proceed with the tricuspid valve intervention. Pacemaker-dependent patients present a unique challenge, especially those requiring right ventricular pacing. Any surgical or interventional procedure must consider the potential risks to the pacing system. Balancing electrical and mechanical interventions to avoid compromising the pacing system while addressing valve-related complications requires careful planning. This case emphasizes the importance of a well-coordinated, multidisciplinary approach to managing complex cardiac conditions.

Introducing leadless pacemaker technology in this context offers significant advantages. Numerous studies and clinical trials have shown that leadless pacemaker implantation is a safe and effective option for patients who depend on pacemakers, especially during transcatheter or surgical valve interventions.^{(3),(4)} Leadless pacemakers, which do not use traditional pacing leads, eliminate many complications associated with lead-related issues, such as infections, lead fractures, and displacement. In this case, switching to a leadless pacemaker facilitated a safer tricuspid valve replacement by removing any interference from leads during the procedure and minimizing the potential risks associated with traditional pacing systems.

Recently announced, the AVEIR DR dual-chamber leadless pacemaker is a groundbreaking innovation, showcasing the incredible benefit of atrioventricular (AV) synchronization.⁽⁵⁾ For patients needing both pacing and defibrillation, the combination of a leadless pacemaker and a subcutaneous implantable cardioverter-defibrillator (ICD) shines as a testament to the extraordinary advances in medical technology, illuminating a brighter future in cardiac care.⁽⁶⁾

Conclusion

In patients who are dependent on pacemakers, addressing the need for valve replacement, especially concerning the tricuspid valve, can be quite complex. However, leadless pacemakers present a promising alternative to transvenous pacemakers for appropriately selected patients following cardiac surgery and transcatheter structural valve interventions. This innovative approach may enhance patient outcomes and streamline the management of such cases.

References

1. Groner A, Grippe K. The leadless pacemaker: An innovative design to enhance pacemaking capabilities. *J Am Acad Physician Assist.* 2019 Jun;32(6):48-50.
2. 2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy. *Eur Heart J.* 2021;00:1-94.
3. Gul EE, Baudinaud P, Waldmann V, Sabbag A, Jubeh Y, Clementy N, Bisson A, Ollitrault P, Conti S, Carabelli A, Dogan Z. Leadless pacemaker implantation following tricuspid interventions: multicenter collaboration of feasibility and safety. *J Interv Card Electrophysiol.* 2024 Aug;67(5):1241-1246.
4. Huang J, Bhatia NK, Lloyd MS, Westerman S, Shah A, Leal M, Delurgio D, Patel AM, Tompkins C, Leon AR, El-Chami MF, Merchant FM. Outcomes of leadless pacemaker implantation after cardiac surgery and transcatheter structural valve interventions. *J Cardiovasc Electrophysiol.* 2023 Nov;34(11):2216-2222.
5. Knops RE, Reddy VY, Ip JE, Doshi R, Exner DV, Defaye P, Canby R, et al. A dual-chamber leadless pacemaker. *N Engl J Med.* 2023 May 20;388(25):2360-70.
6. Knops RE, Lloyd MS, Roberts PR, Wright DJ, Boersma LVA, Doshi R, Friedman PA, et al. A modular communicative leadless pacing-defibrillator system. *N Engl J Med.* 2024 May 18;391(15):1402-1412.

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APHRS 2025

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IMPORTANT DATES

APRIL 2025 : Abstracts close

MAY 2025 : Review finalised

JULY 2025 : Speaker notifications

AUGUST 2025 : Registration opens

SEPTEMBER 2025 : Early bird registration rates end



Abstracts open

