Challenging epicardial VT ablation

Novelties and challenges in ventricular tachycardia ablation

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UKH Universitätsklinikum Halle (Saale)

MITTELDEUTSCHES HERZZENTRUM Universitätsmedizin Halle (Saale)

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Conflict of Interests: NONE

Overview

- **Novelties:**
  - Patient selection
  - Imaging and Image integration
  - New energy sources
- **Challenges:**
  - Access challenges
  - Anatomical challenges
  - Safety challenges
- **Visual Summary**

Rahel Hirsch

Brief History:

*In the early **1990s**, **d'Avila** found an article by Svenson on laser epicardial photocoagulation, suggesting that VT was related to an epicardial circuit in some patients.*

***Sosa** **observed** late potentials on ventricular electrograms recorded from the coronary sinus in patients with Chagas' disease.*

***1995:** The Tuohy needle, a specially designed needle to prevent vascular and neural damage during epidural anesthesia, was brought to the attention of **Scanavacca**.*

*Inspired by the need to better treat VA in Chagas disease, **Sosa** et al. introduced the subxiphoid percutaneous epicardial mapping and/or ablation in **1996**.*

1942-2020

ESC European Society of Cardiology
Europace (2025) **27**, euaf055
https://doi.org/10.1093/europace/euaf055
EHRA DOCUMENT
EHRA European Heart Rhythm Association

Epicardial ventricular arrhythmia ablation: a clinical consensus statement of the European Heart Rhythm Association of the European Society of Cardiology and the Heart Rhythm Society, the Asian Pacific Heart Rhythm Society, the Latin American Heart Rhythm Society, and the Canadian Heart Rhythm Society

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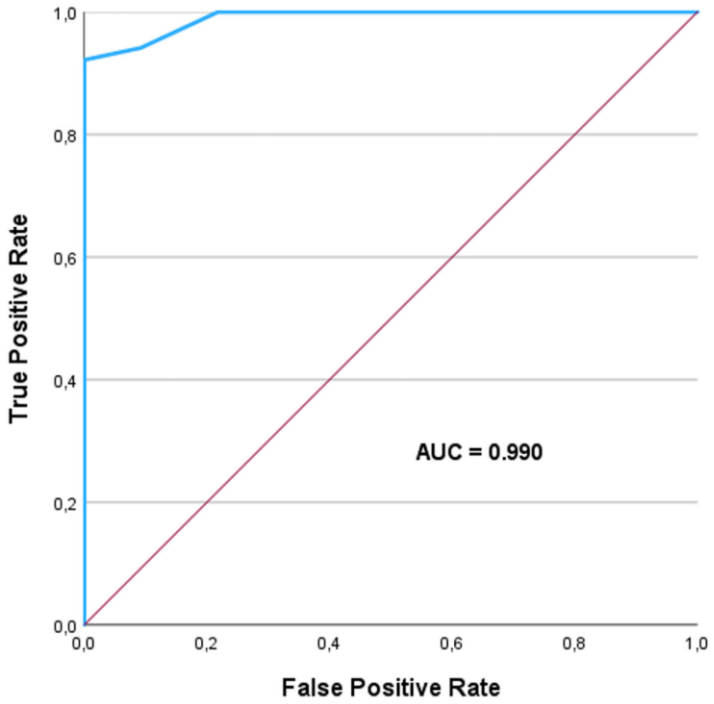
TABLE 1 | The simple 4 components of preprocedural and its grading for the EPI-VT-Score: underlying cardiomyopathy (CM), left ventricular ejection fraction (LVEF), number of prior VT-ablation and VT-QRS Interval.

Variable		Points
Cardiomyopathy (CM)	ICM	1
	DCM	2
	CD (myocarditis, sarcoidosis, Chagas disease, etc.)	3
Ejection fraction (EF%)	≤ 35	1
	35–45	2
	≥ 45	3
Number of prior VT-ablation	0	1
	1	2
	≥ 2	3
VT-QRS Interval (ms)	≤ 180	1
	180–220	2
	≥ 220	3
Total		12

Abbreviations: CD, cardiac disease; DCM, dilated cardiomyopathy; ICM, ischemic cardiomyopathy.

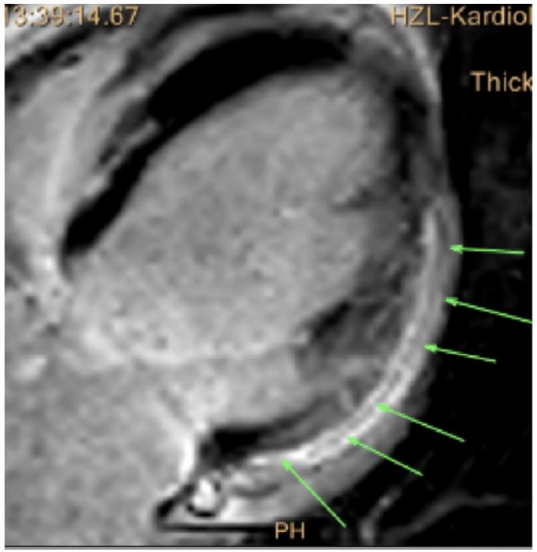


A score ≥ 8 identified epicardial need with 92.2% sensitivity and 100% specificity. Patients scoring < 8 were effectively managed with endocardial-only ablation.

Journal of Cardiovascular Electrophysiology, 2025; 36:2870–2877

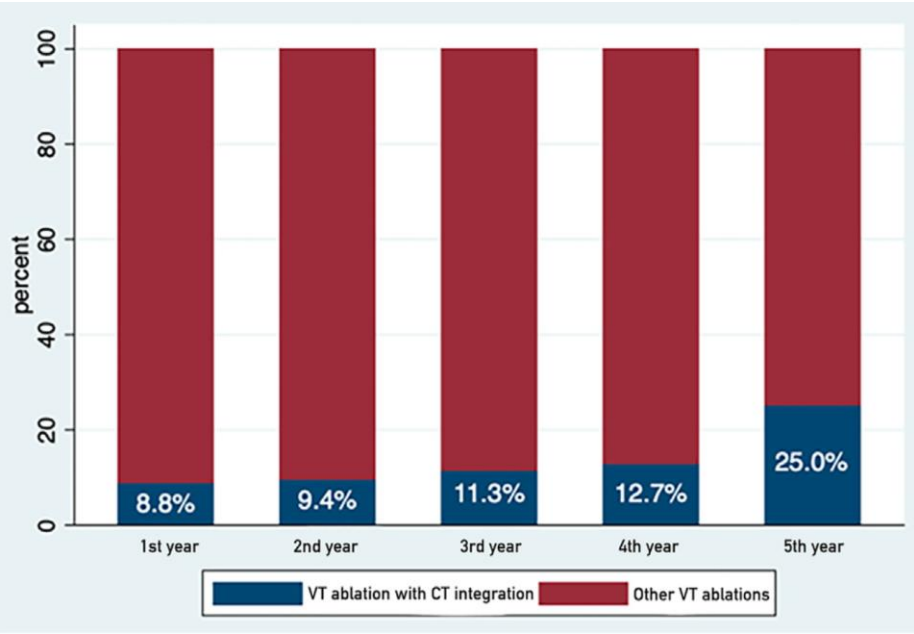
Section 3:
Criteria to consider epicardial access and mapping (2)

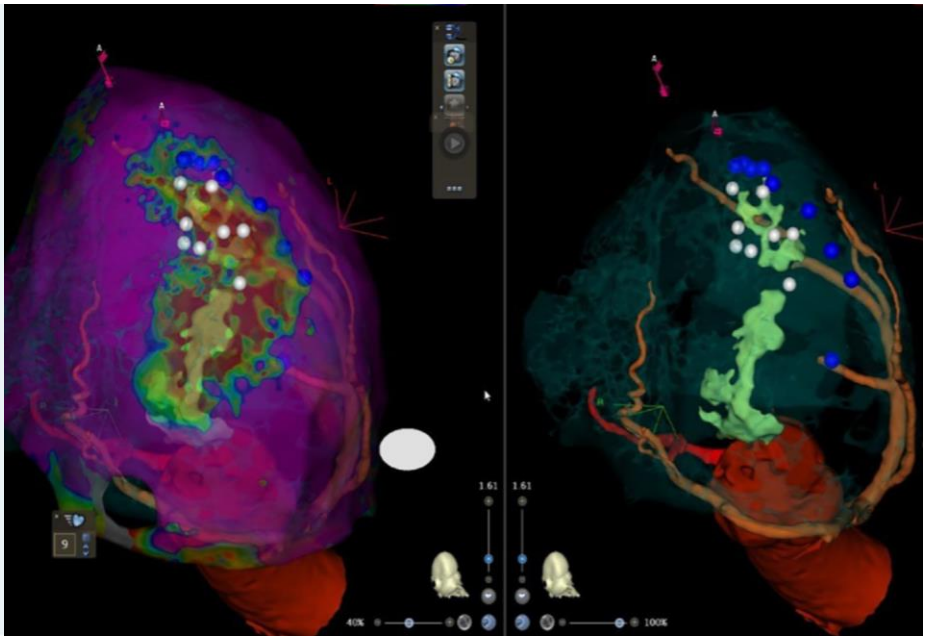
ECG, imaging, and previous mapping findings are essential for patient selection. - Certain cardiomyopathies—such as ARVC, Chagas disease, or Brugada



Advice	Strength of evidence
Advice TO DO	
Routine pre-procedural cardiac MRI to assess the presence, location, distribution, and extent of ventricular scars is advised in patients with non-ischaemic cardiomyopathy[55,72–80]	

A. Arya et al. Europace (2025) 27, euaf055

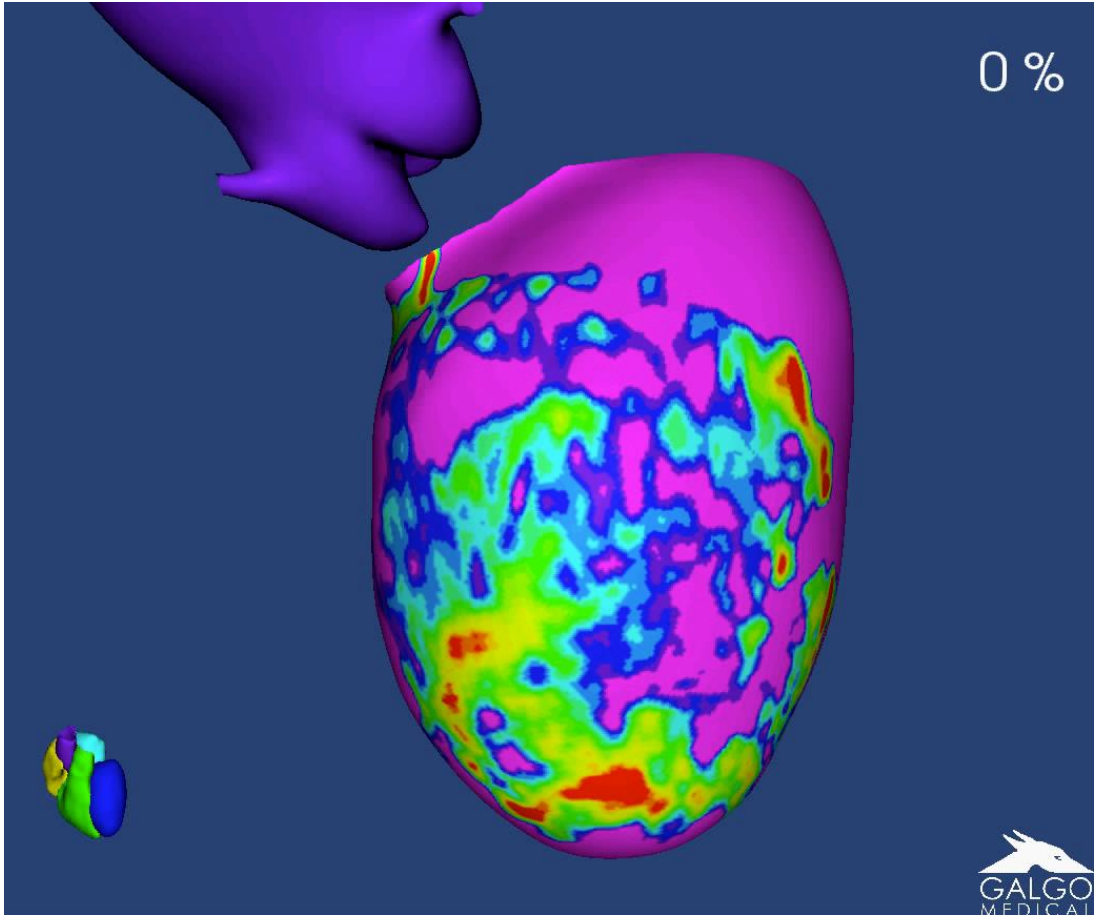




Real-time image integration of pre-acquired MDCT information is **feasible and accurate**. **Epicardial fat 7 mm and the presence of coronary arteries** are important reasons for epicardial ablation failure. Visualization of fat thickness during the procedure may **facilitate the interpretation of bipolar electrograms and the identification of ineffective ablation sites**.

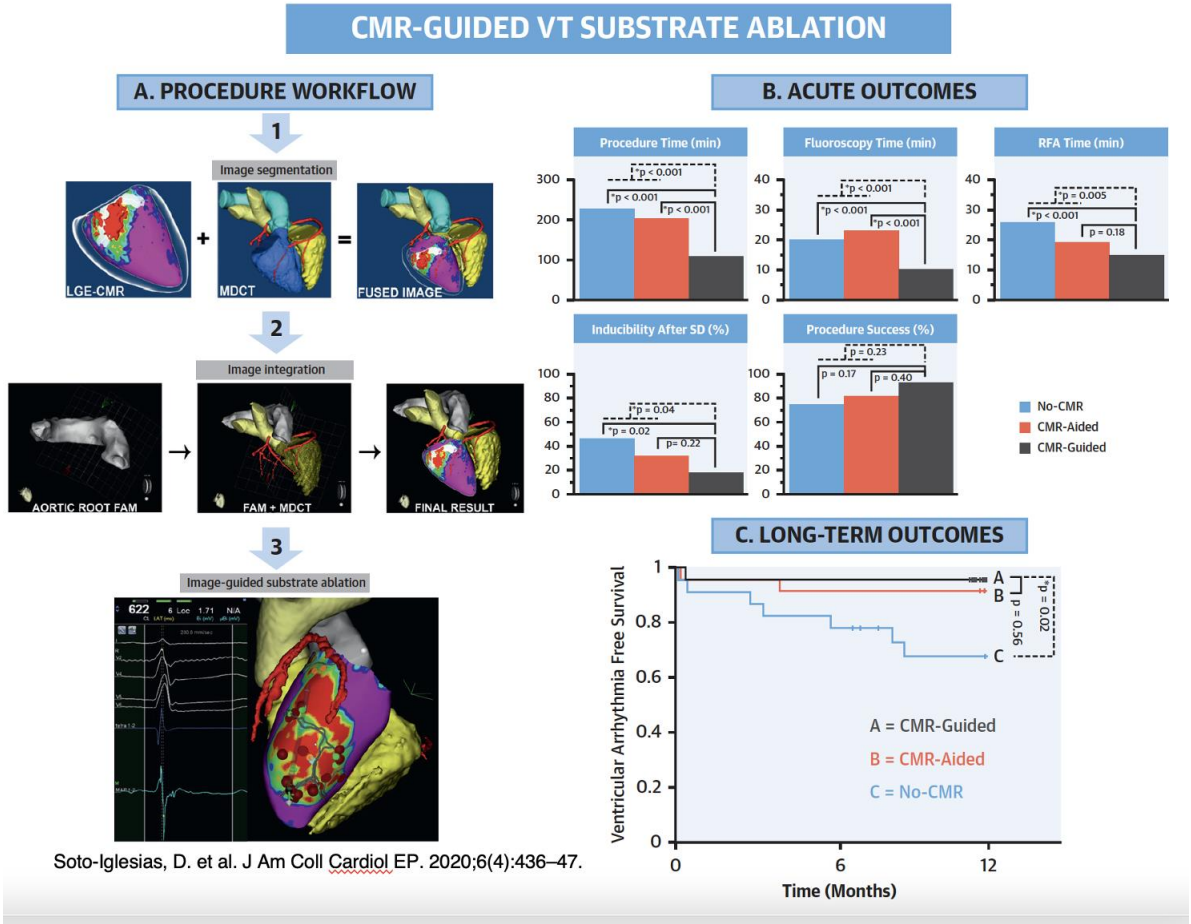
Heart Rhythm 2024;21:2491–2498

Substrate Visualization



Eighty-four patients with scar-dependent MMVT who underwent substrate ablation were included in the study.

MR-guided VT ablation is **feasible and safe**, significantly reduces the procedural, fluoroscopy, and radiofrequency times, and is associated with a ***higher non-inducibility rate and lower VT recurrence*** after substrate ablation.



Soto-Iglesias, D. et al. J Am Coll Cardiol EP. 2020;6(4):436–47.

New energy sources

Sections 5 and 6:
Epicardial mapping and delivering epicardial lesions

Performing a safe and effective procedure that eliminates the arrhythmia as efficiently as possible.

A personalized, interdisciplinary planned procedure with individually defined endpoints and customized mapping strategies.

May be appropriate TO DO

Use of multielectrode mapping catheter may be useful to accelerate and enhance epicardial mapping[81]

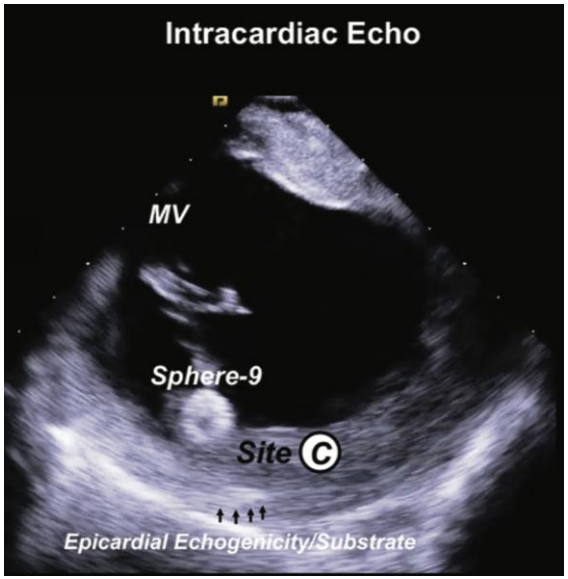
Advice TO DO

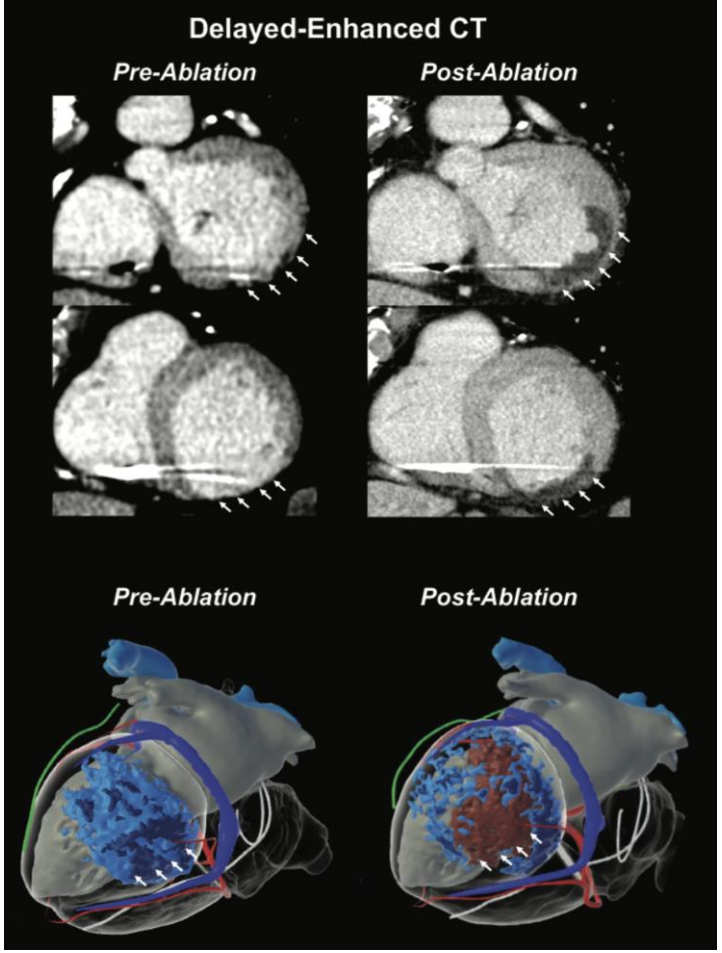
Achieving noninducibility and ablation of all late potentials are advised endpoints for epicardial VA ablation[121–124]

RESEARCH LETTER

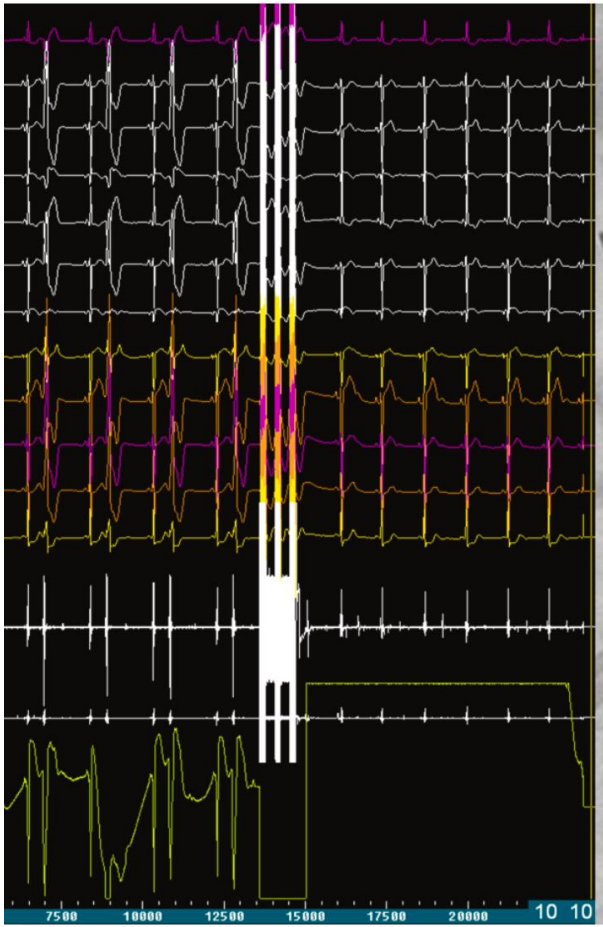
Elimination of Epicardial Scar-Related Ventricular Tachycardia With Endocardial Pulsed Field Ablation: First Clinical Report

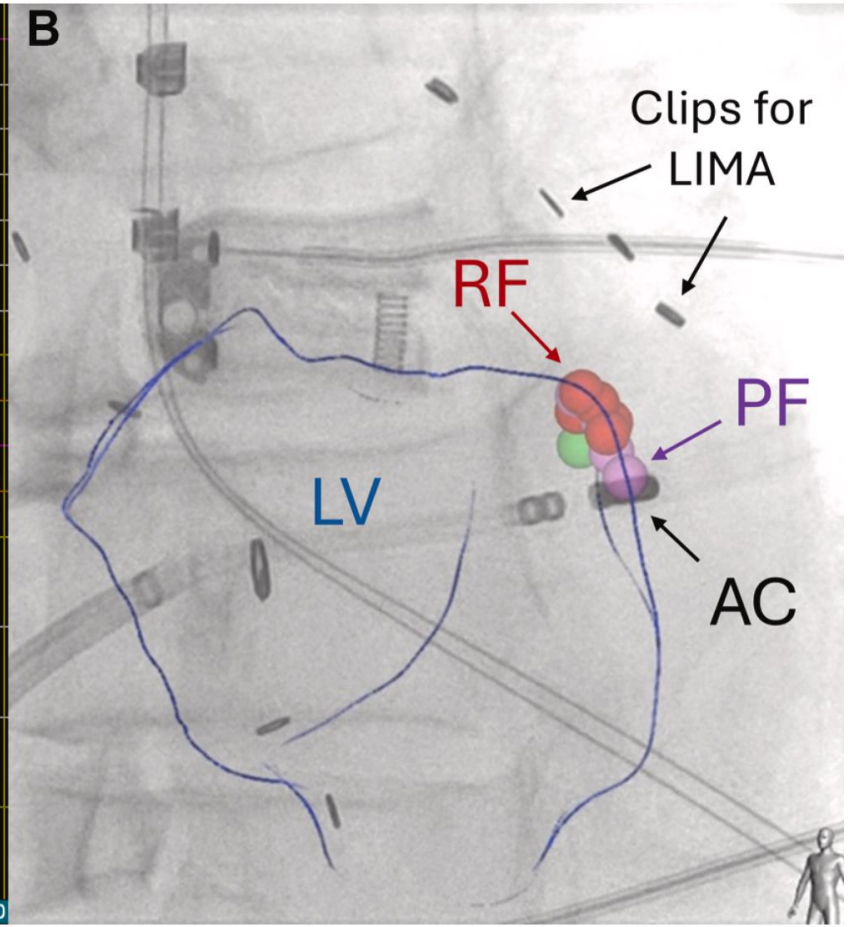
Jose Aguilera, MD; Edmond Obeng-Gyimah, MD; Yuki Kuramochi, BSN, RN; Roy Chung, MD; Hubert Cochet, MD; Megan Christie, CRNP; Hiroshi Nakagawa, MD, PhD; Jakub Sroubek, MD, PhD; Oussama Wazni, MD, MBA; Pasquale Santangeli, MD, PhD



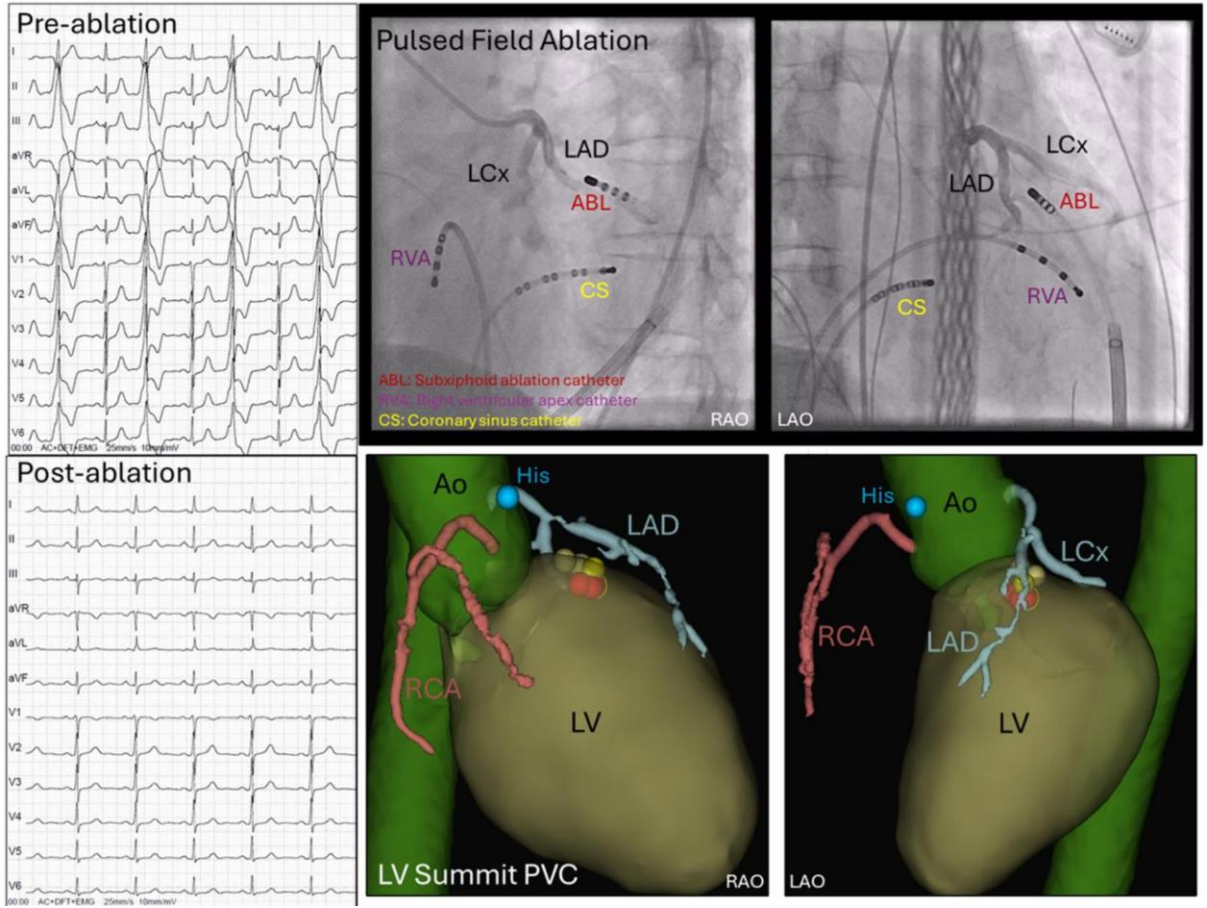


Circ Arrhythm Electrophysiol. 2024;17:e012992.





JACC EP 2025: In Press



European Heart Journal - Case Reports (2024) 8, ytae478

HeartRhythm
The Official Journal of the Heart Rhythm Society, The Cardiac Electrophysiology Society, and The Pediatric & Congenital Electrophysiology Society
Heart Rhythm Society SM

Delayed coronary artery vasospasm leading to cardiac arrest after pulsed field ablation for atrial fibrillation

Gen Matsuura, MD, PhD,[1,2] Hidehira Fukaya, MD, PhD,[2] Tomoharu Yoshizawa, MD, PhD,[1,2] Atsuhiko Sugimoto, MD, PhD,[1] Junya Ako, MD, PhD[2]

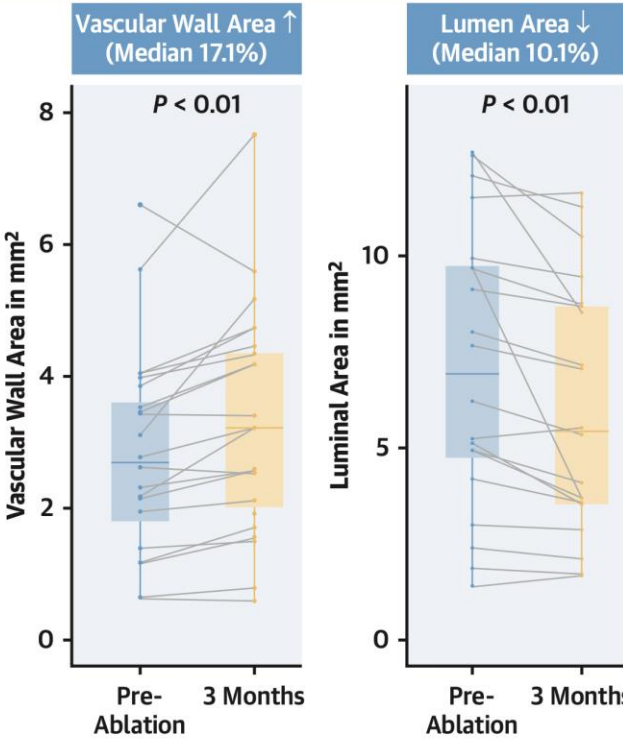
Heart Rhythm 2025: In Press

Effect of Epicardial Pulsed Field Ablation Directly on Coronary Arteries

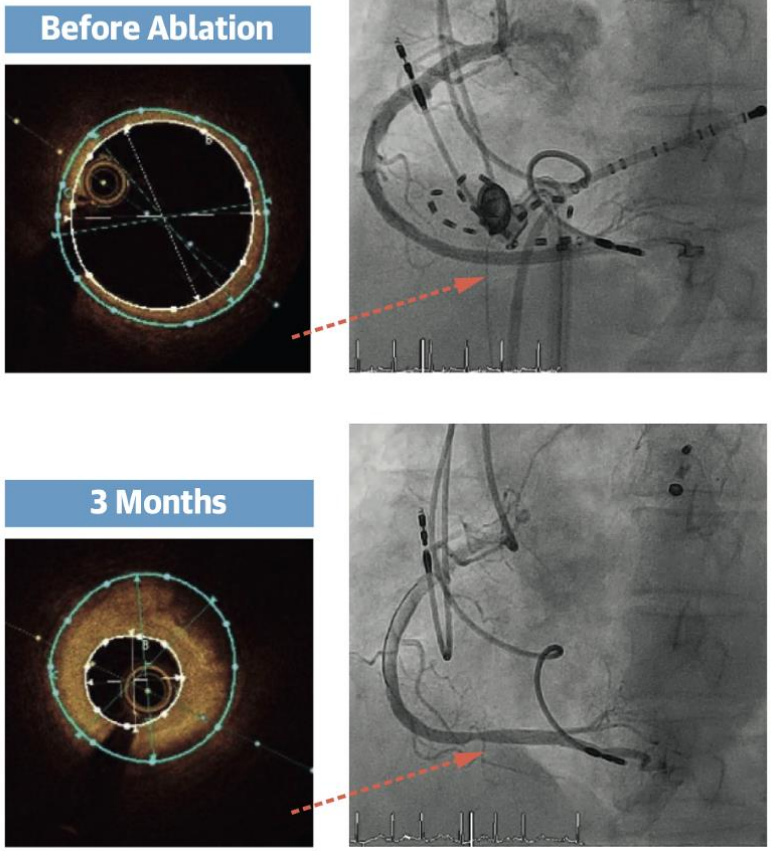
Satoshi Higuchi, MD,[a] Sung Il Im, MD,[a] Carol Stillson, BS,[a] Eric D. Buck, MS,[b] Samantha Jerrell, BS,[b] Christopher W. Schneider, MENG,[b] Molly Speltz, DVM,[c] Edward P. Gerstenfeld, MD[a]

J Am Coll Cardiol EP 2022;8:1486–1496

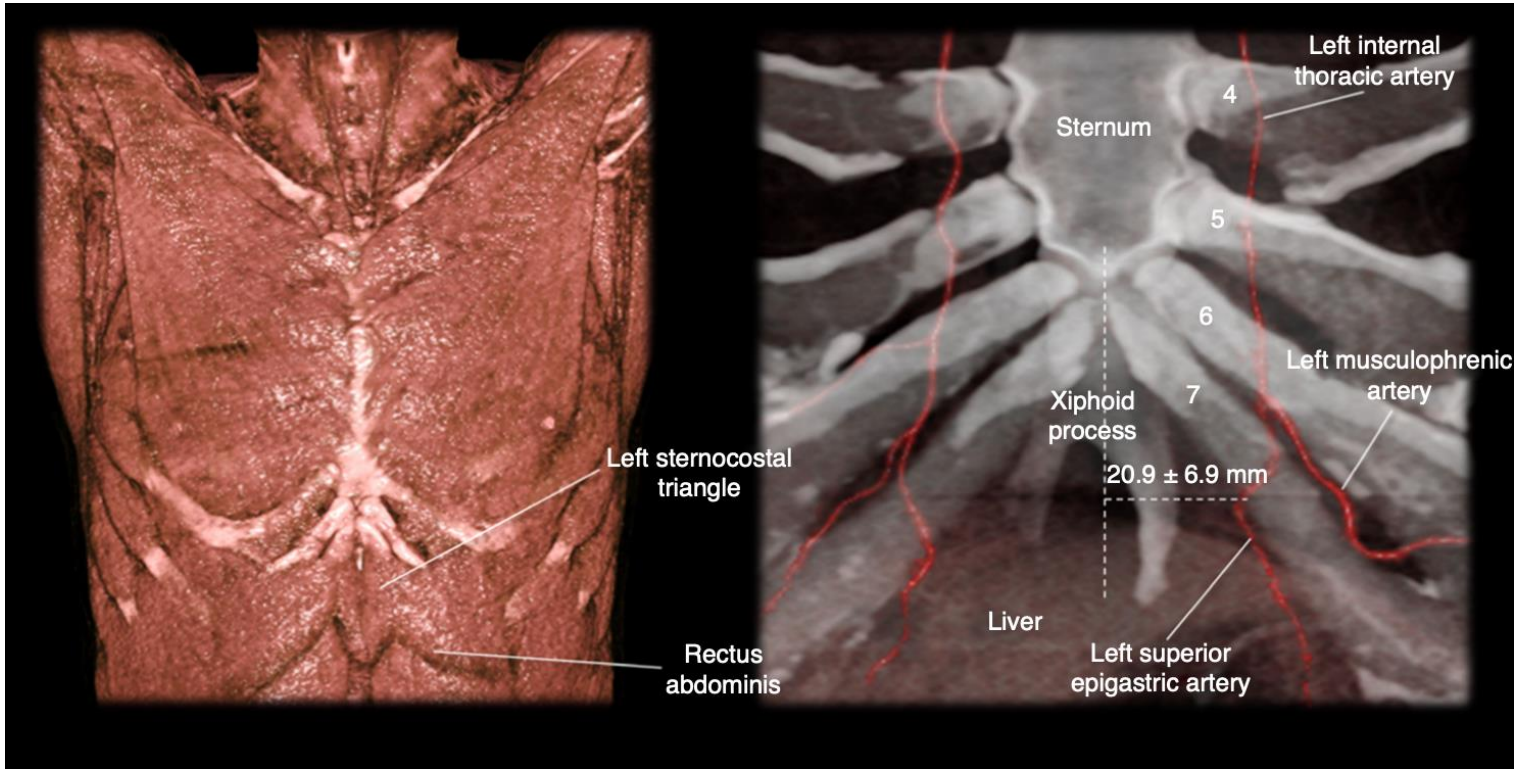
PFA Near 20 Coronary Vessels for CTI or Mitral Isthmus Atrial Flutter
Serial OCT Before, During and 3 Months After Ablation



Tam MTK, et al. JACC Clin Electrophysiol. 2025;11(7):1478-148



Access, anatomical and safety Challenges



A. Arya et al. Europace (2025) 27, euaf055

Advice	Strength of evidence

Triamcinolone (Methylprednisolone)

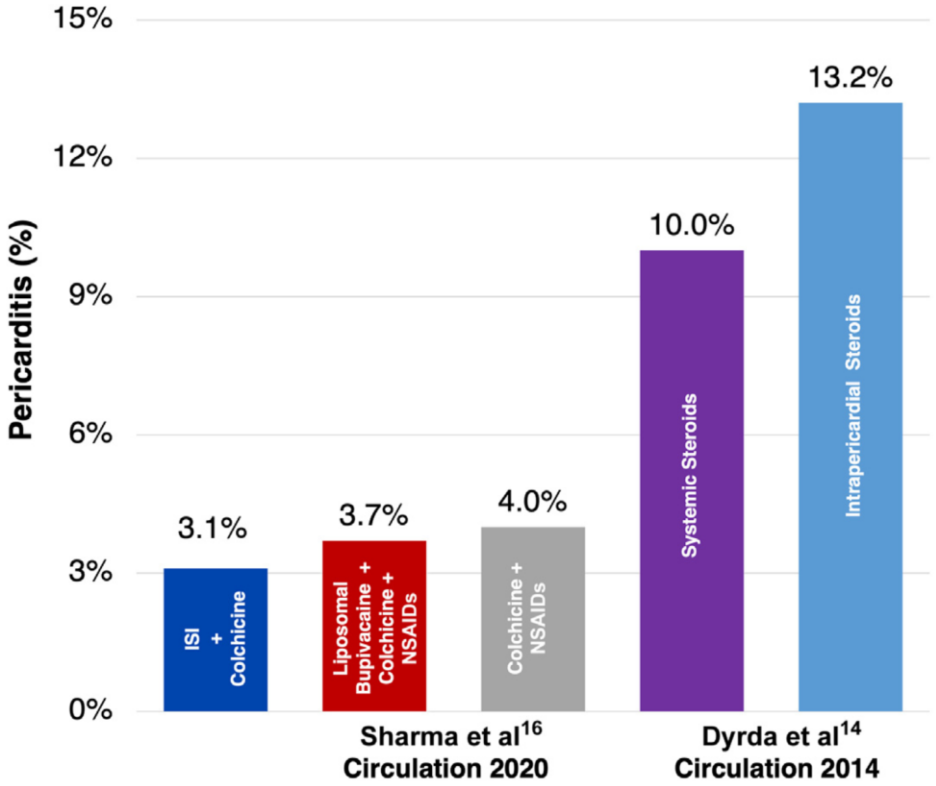
Colchicine

May be appropriate TO DO

Triamcinolone (2 mg/kg) or Methylprednisolone (250 mg) for intrapericardial injections after the procedure may be useful to avoid adhesions and chest pain[184,185]

Routine administration of colchicine in patients undergoing epicardial VA catheter ablation to reduce the risk of post-procedural pericarditis and chest pain may be useful[182]

FIGURE 2 Rate of Pericarditis Compared With Historical Control Groups



JACC Clin Electrophysiol. 2025;11:498–5087

Tamponade and hemopericardium

Definition: compression of the heart due to the pericardial accumulation of fluid, blood, pus, clot, or gas.

Incidence (HP): 5–10%
Incidence (T): 1.5–5%

Clinical presentation

- Dyspnea
- Chest pain
- Lethargy
- Decreased blood pressure
- Palpitation (tachycardia)

Investigation

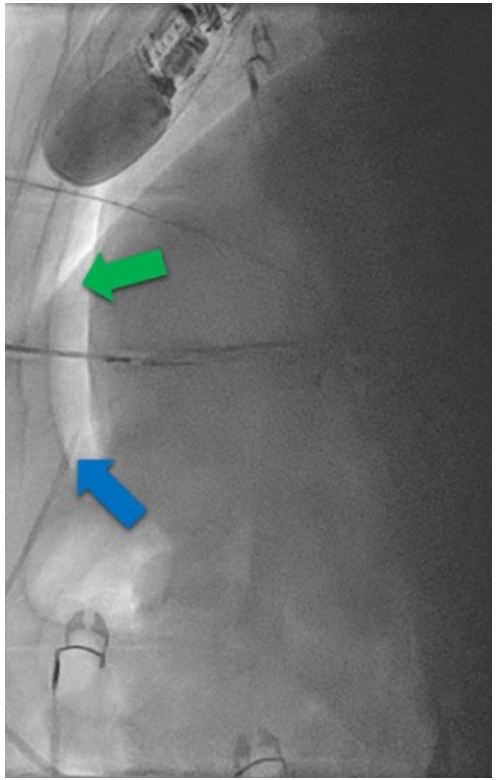
- Echocardiography
- Pulsus Paradoxus
- Elevated jugular venous pressure
- Electrical alternans in ECG

How to prevent

- Always place a guidewire or a small catheter into the epicardial sheath
- Gentle catheter and sheath movement especially in patients with adhesions
- Micropuncture and CO_2 techniques
- Always place a guidewire before the sheath's removal

Management

- Prompt diagnosis
- Continuous pericardial drainage
- Reversal of anticoagulation if needed
- Cardiac surgery, if necessary



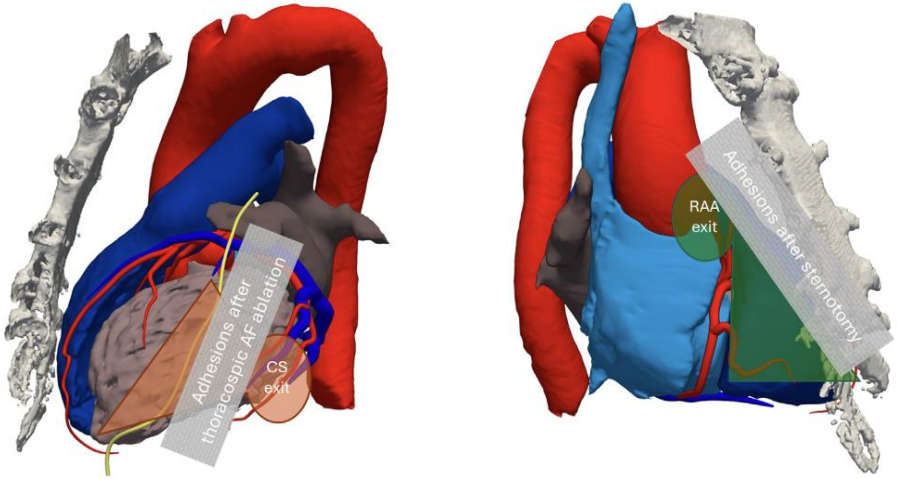
CO_2 insufflation for epicardial access

- Risk of posterior adhesions (prior thoracoscopic surgical AF ablation)
- Anterior substrate
- Contrast agent is a concern
- Risk of LV lead displacement

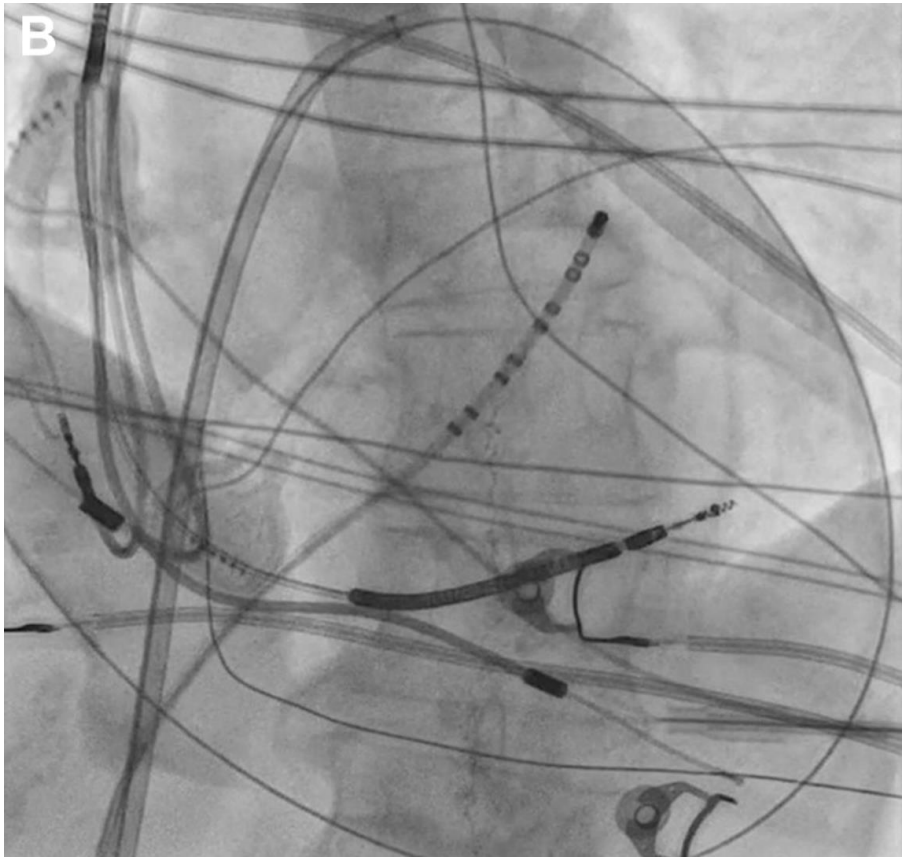
TAPI-CO_2 (anterior exit)

- Risk of anterior adhesions (prior sternotomy)
- Infero-lateral substrate

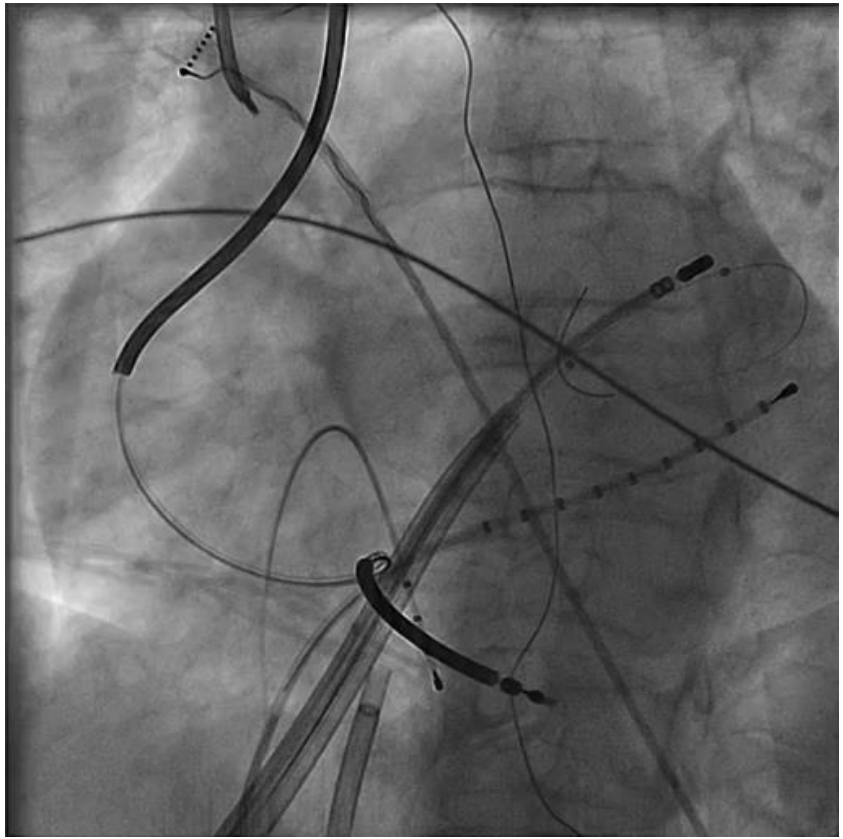
Coronary Sinus (posterior exit)

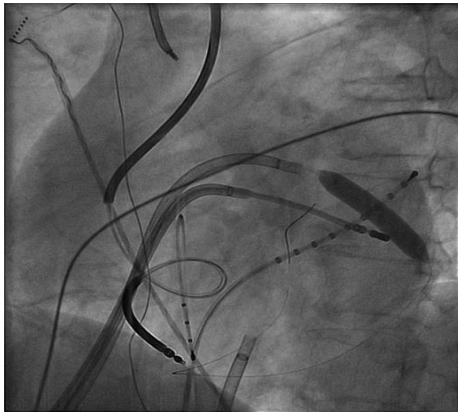


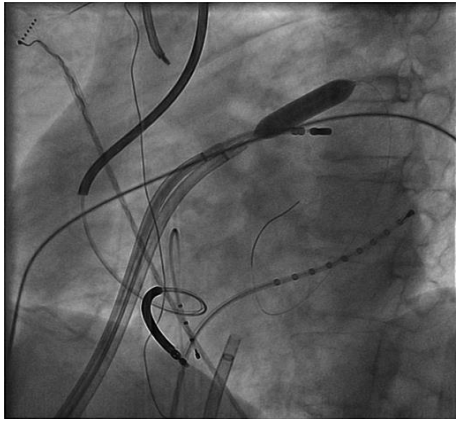
Heart Rhythm 2025;22:1718–1727



JACC: CLINICAL ELECTROPHYSIOLOGY VOL. 11, NO. 11, 2025







Vascular Balloon-Assisted Lysis of Pericardial Adhesions to Facilitate Epicardial Ventricular Tachycardia Ablation

Jorge E. Romero, MD,[a] Angel E. Armas, MD,[a] Mohamed Gabr, MD,[a] Alejandro Velasco, MD,[b] Ely Gracia, MD,[a] Christian A. Gozzo, BS,[a] Daniel A. Zapata, MD,[a] Nathaniel A. Steiger, MD,[a] Usha B. Tedrow, MD, MS,[a] William H. Sauer, MD[a]

Hydrodissection for pericardial adhesion in percutaneous epicardial ventricular tachycardia ablation

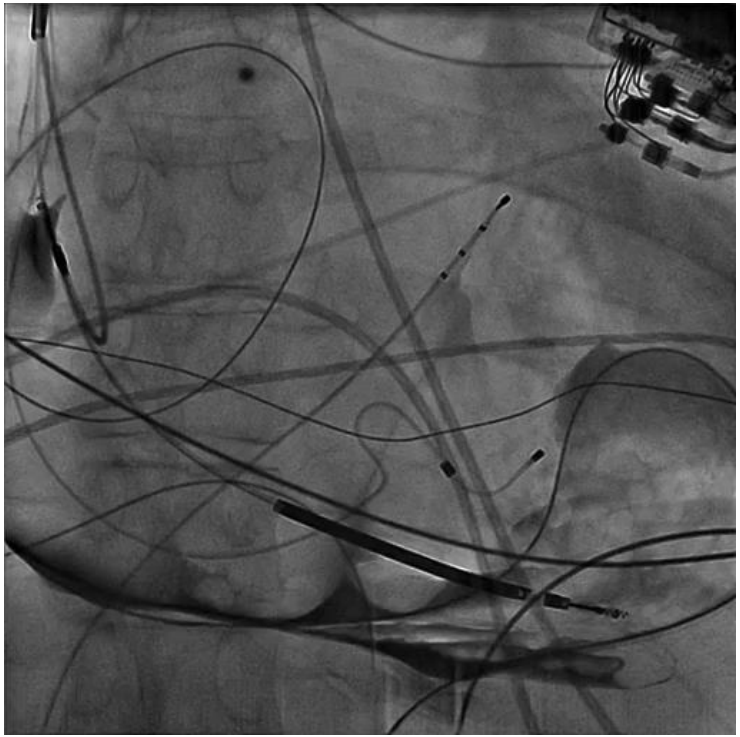
Yoshimi Onishi MD, PhD | Taku Asano MD, PhD | Shuhei Arai MD, PhD | Yuya Nakamura MD, PhD | Toshiro Shinke MD, PhD

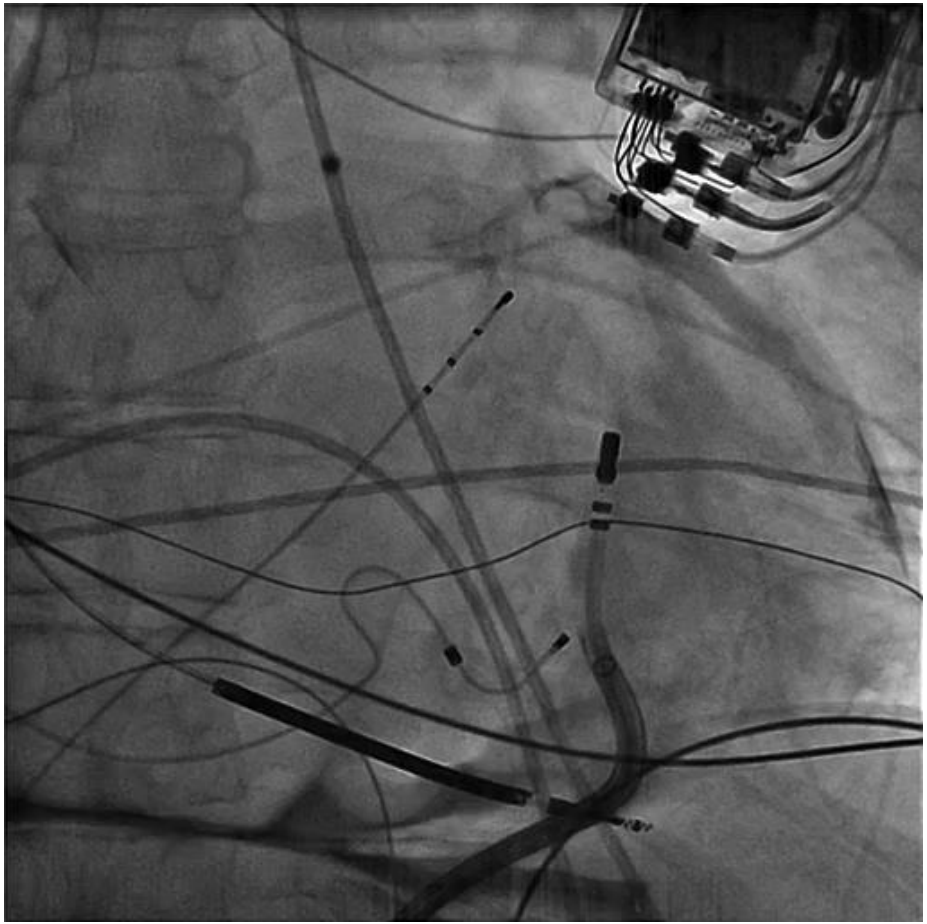
Safety and Effectiveness of Surgical Pericardial Access for Catheter Ablation of Epicardial Ventricular Tachycardia

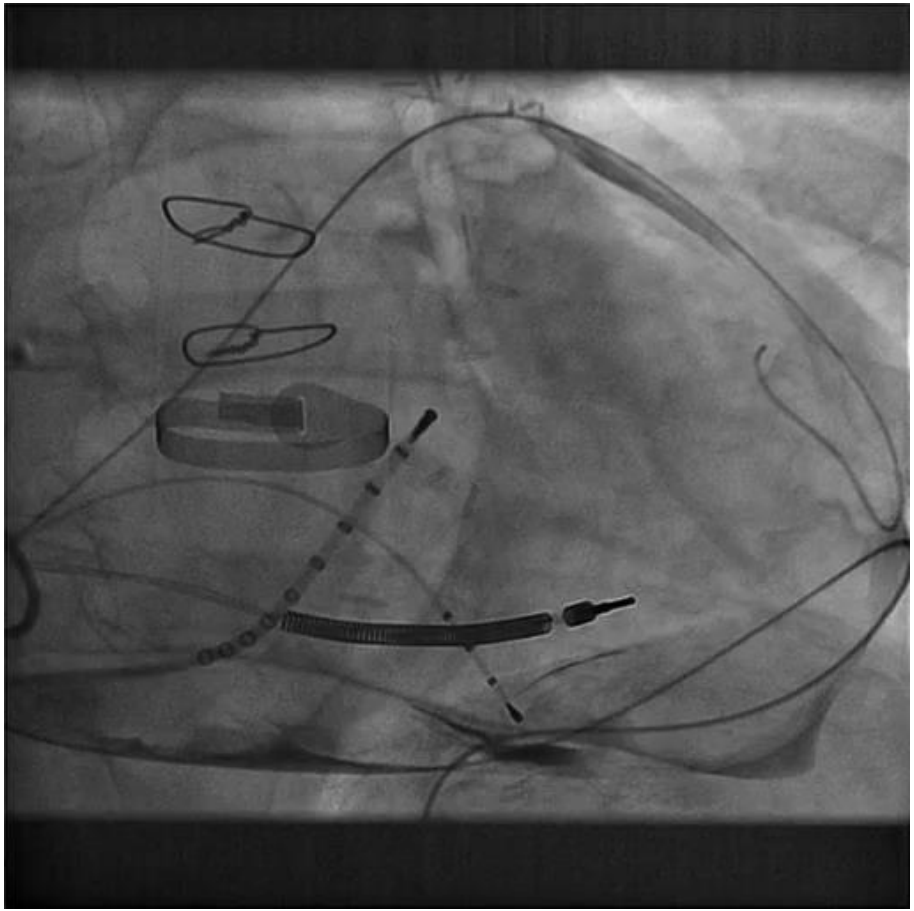
A Multicenter Experience

Feasibility of Upfront Surgical Subxiphoid Epicardial Access for Hybrid Ablation of Ventricular Tachycardia

Advice	Strength of evidence
Advice TO DO	
It is advised to consider patient's body mass index when assessing risk of complications, outcome, and eligibility for epicardial VA ablation[217]	 >90% agree
A surgical epicardial window is advised after cardiac bypass surgery[177,218]	
May be appropriate TO DO	
A surgical epicardial window may be a useful alternative to standard subxiphoid puncture after non-bypass cardiac surgery OR in repeat procedures with severe adhesions[177,218–220]	





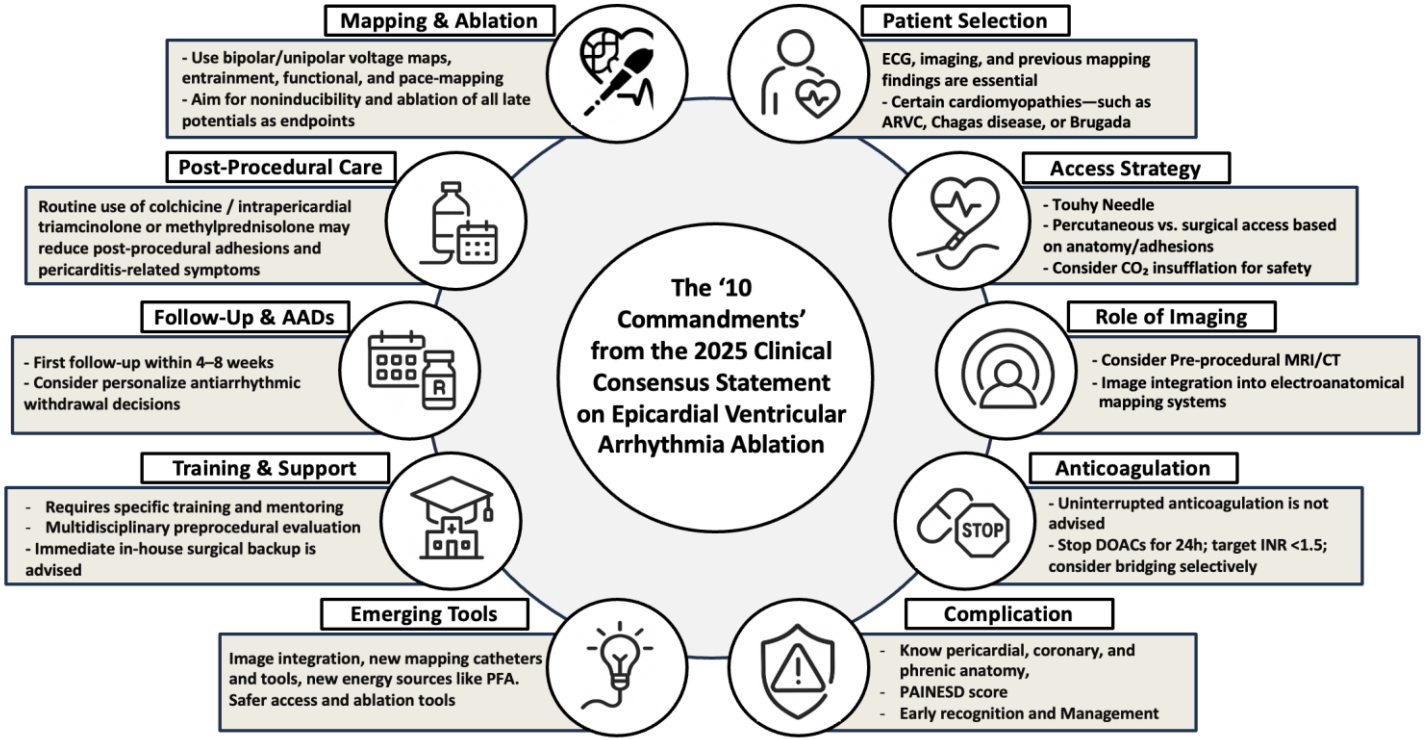


ATTENTION

Even in the absence of coronary grafts, care is needed during epicardial mapping in individuals with coronary artery disease.

This is owed to the presence of **bridging veins that traverse, via the visceral pericardium, from the parietal pericardium to the myocardium** (especially in non-revascularized CAD). Catheter manipulation and adhesiolysis can disrupt **these natural bypasses**.

Take-home summary



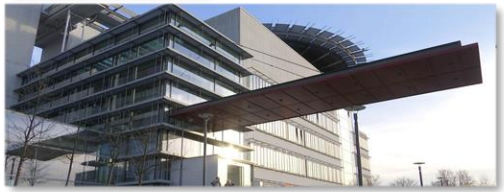
* Shamloo AS, DiBiase L, Arya A. EHJ 2025: accepted manuscript

Thank you for your attention!







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