2021

Outcomes of Catheter Ablation of Ventricular Tachycardia Based on Etiology in Nonischemic Heart Disease: An International Ventricular Tachycardia Ablation Center Collaborative Study

Akhila R. Kunuthuru
Virginia Commonwealth University

Outcomes of Catheter Ablation of Ventricular Tachycardia Based on Etiology in Nonischemic Heart Disease: *An International Ventricular Tachycardia Ablation Center Collaborative Study*

Marmar Vaseghi, Tiffany Y. Hu, Roderick Tung, et al.

Published September 2018

Akhila Kunuthuru

Background

- Even though catheter ablation of ventricular tachycardia (VT) has become a popular option to treat patients with nonischemic cardiomyopathy, there are few to none randomized studies on VT ablation on this population.
- Three options to treat VT: antiarrhythmic drugs (AADs), implantable cardioverter-defibrillator (ICD), and catheter ablation (CA)
    - CA is the most common treatment for VT in nonischemic cardiomyopathy patients.
- CA for VT in nonischemic cardiomyopathy (NICM) patients is reported to be less favorable than with patients with ischemic cardiomyopathy (ICM).
    - This study uses a large group of patients globally to evaluate outcomes of NICM who underwent a VT catheter ablation through the observation of specific etiologies and adjusting outcomes for known comorbidities.

Overview

- International Collaborative Study across 12 centers with data from 2,075 patients with structural heart disease who were referred for catheter ablation of VT
- 780 NICM patients of the 2,075 structural heart disease patients
  - Mean age: 57 ± 14 years, 18% women, left ventricular ejection fraction 37 ± 13%
- 6 most common NICM etiologies for further data collection:
  - Myocarditis
  - Arrhythmogenic right ventricular cardiomyopathy (ARVC)
  - Dilated idiopathic cardiomyopathy (DICM) with ejection fraction <50%
  - Hypertrophic cardiomyopathy
  - Valvular cardiomyopathy
  - Sarcoidosis

Methods

- 2,075 patients with structural heart disease with a catheter ablation performed between 2002-2014 → 780 patients with NICM and an identified etiology
- Largest confounding variables were taken into account with adjusted etiology data for VT recurrences, death, and cardiac transplantation
    - Age, NYHA functional class, LVEF, ablation center, prior VT ablation, etc.

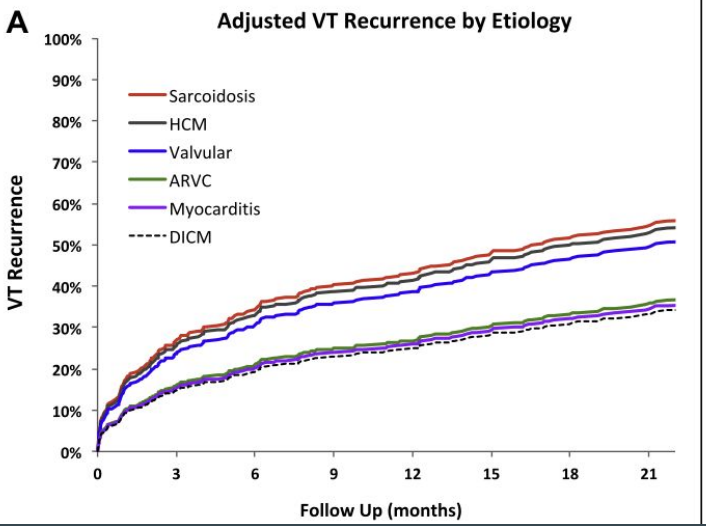
TABLE 1 Patient Characteristics by Etiology

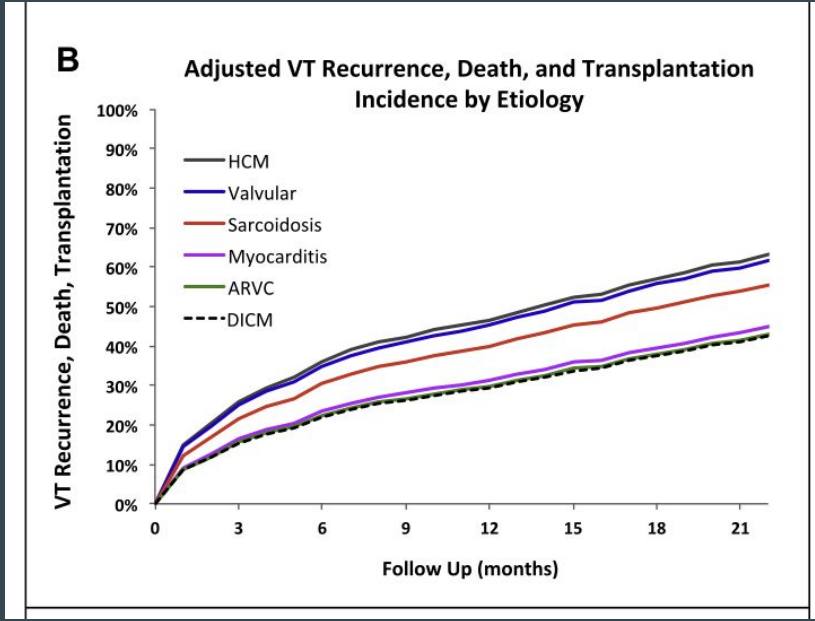
	All (N = 780)	DICM (n = 518)	ARVC (n = 100)	Valvular (n = 50)	Myocarditis (n = 50)	HCM (n = 35)	Sarcoidosis (n = 27)	p Value
Age, yrs	57 ± 14	60 ± 13	46 ± 16	65 ± 11	50 ± 15	59 ± 12	50 ± 11	<0.01
Female	18	18	22	16	14	11	30	0.40
LVEF, %	37 ± 13	33 ± 13	53 ± 11	31 ± 13	43 ± 16	41 ± 17	39 ± 15	<0.01
NYHA functional class								<0.01
I	40	31	73	30	62	44	48	
II	34	35	24	40	22	35	48	
III	21	27	2	26	14	15	4	
IV	1%	7	1	4	2	6	0	

Results

- One-year freedom from VT was 69%, and freedom from VT, heart transplantation, and death was 62%.
- Unadjusted Competing Risk Analysis Conclusion: VT ablation in ARVC showed greater VT-free survival than DICM; 82% for ARVC did not express VT factors in follow-ups
    - Valvular cardiomyopathy had the poorest survival with 42% of patients showing VT recurring factors.
- Adjusted Comorbidities: myocarditis, ARVC, and DICM had similar outcomes and the most positive results; hypertrophic cardiomyopathy, valvular cardiomyopathy, and sarcoidosis had the highest risk for recurrence

FIGURE 4 Adjusted VT Recurrence and Adjusted VT Recurrence, Death, and Transplantation by NICM Etiology





(A) Adjusted ventricular tachycardia (VT) recurrence rates by etiology and **(B)** adjusted combined endpoint of VT recurrence, death, and transplantation by etiology are shown. Valvular cardiomyopathy, hypertrophic cardiomyopathy (HCM), and sarcoidosis have the least favorable outcomes compared with dilated idiopathic cardiomyopathy (DICM). There is no difference in the adjusted outcomes of arrhythmogenic right ventricular cardiomyopathy (ARVC) and myocarditis as compared with DICM.

Discussion

- Largest study to analyze VT ablation outcomes in these specific NICM etymologies: valvular heart disease, myocarditis, and HCM
- One of the initial studies to explore the effects of certain etiologies on catheter ablation for VT in patients with NICM
- Global study across specialized VT ablation centers also allowed this study to have a large number of patients for participation.
- Main Conclusion: Etiology of NICM is a significant predictor of VT recurrence, death, and cardiac transplantation.
- Future outlooks: translational studies and specific models of NICM to better understand specific etiologies and the characterization of the substrates

Questions

- What are some advantages of performing an international collaborative study?
  - What are some disadvantages?
- What might be some study limitations for this specific study?
  - Discussion of confounders

Discussion among members was led to critically think about these questions in relation to this study, as well as how other medical studies in various fields might be impacted by performing a global study, rather than a localized or even a national study. Although this study took into perspective the possibility of the presence of confounders, it is not logistically possible to review every additional factor that might affect the results, especially with an international study. However, as this is one of the largest studies to analyze VT ablation in specific etymologies of NICM, our scholars felt that this study would be the first of many to further explore this subject.

Sources

Outcomes of Catheter Ablation of Ventricular Tachycardia Based on Etiology in Nonischemic Heart Disease: An International Ventricular Tachycardia Ablation Center Collaborative Study:

https://www-sciencedirect-com.proxy.library.vcu.edu/science/article/pii/S2405500X18304006

Catheter ablation of ventricular tachycardia in nonischemic cardiomyopathy

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6111485/

Bibliography

Okubo K, Gigli L, Della Bella P. Catheter ablation of ventricular tachycardia in nonischemic cardiomyopathy. *J Arrhythm*. 2018;34(4):347-355. Published 2018 Aug 28. doi:10.1002/joa3.12099

Vaseghi, M., Hu, T. Y., Tung, R., Vergara, P., Frankel, D. S., Di Biase, L., Tedrow, U. B., Gornbein, J. A., Yu, R., Mathuria, N., Tzou, W. S., Sauer, W. H., Burkhardt, J. D., Tholakanahalli, V. N., Dickfeld, T., Weiss, J. P., Bunch, T. J., Reddy, M., Callans, D. J., . . . Shivkumar, K. (2018). Outcomes of Catheter Ablation of Ventricular Tachycardia Based on Etiology in Nonischemic Heart Disease: An International Ventricular Tachycardia Ablation Center Collaborative Study. *JACC: Clinical Electrophysiology*, *4*(9), 1141-1150. https://doi.org/10.1016/j.jacep.2018.05.007.