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RESEARCH LETTER

International Practice Patterns in the Detection and Management of Arrhythmias in Patients With Hypertrophic Cardiomyopathy

Matthew Cheung, BSc*; Ali Husain, MD*; Darson Du, MD; Christopher O. Y. Li, MD; Jeremy Parker, PhD; Adaya Weissler-Snir, MD; Jeffrey B. Geske, MD; Kevin Ong, MD; Zachary Laksman, MD, MSc

Atrial fibrillation (AF) occurs in 22% to 32% of patients with hypertrophic cardiomyopathy (HCM),[1,2] with ≈50% experiencing subclinical/asymptomatic AF on cardiac rhythm monitoring devices, including implantable loop recorders, implantable cardioverter-defibrillators (ICDs), and permanent pacemakers.[3] Nonsustained ventricular tachycardia (NSVT) is associated with a higher risk of sudden cardiac death in patients with HCM.[4] Faster, longer, and repetitive episodes of NSVT may confer greater risk.[5] Current guidelines do not directly address the role of different arrhythmia screening strategies (screening frequency, role of extended monitoring, wearable devices) and optimal management of detected arrhythmias. We conducted an international multicenter survey to evaluate practice patterns and expert opinions regarding AF and NSVT screening and management at HCM comprehensive care centers.[1]

Survey questions were developed by experts with established practices in cardiac electrophysiology (ZL and AWS) and HCM (AWS, KO, and JG). The current study was approved by the University of British Columbia (UBC) research ethics board. This survey was generated and distributed by the Canadian-hosted Qualtrics UBC Survey tool.

This survey was anonymously and individually distributed to a predetermined list of 34 clinical experts working at HCM comprehensive care centers in North America, Australia, and Europe in May 2021. Informed consent was obtained at the beginning of the survey.

Anonymized data underwent descriptive statistics and visualization using the survey tool. The data that support the findings of this study are available from the corresponding author on reasonable request.

We received 23 full and 1 partial response (Table), of 34, from experts in Canada (n=5), the United States (n=10), Germany (n=1), Denmark (n=1), Italy (n=1), Australia (n=1), Spain (n=1), Switzerland (n=1), and the United Kingdom (n=2). Most respondents (65.2%) had >10 years of practice experience. Each center evaluates a mean of 265 (SD, 165) new patients with HCM annually.

Routine screening was performed by 87% of respondents. Most experts (78%) considered left atrial dilatation an important factor when considering screening. Consumer wearable devices were the third most used screening tool (56%) and 91% would

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Correspondence to: Zachary Laksman, MD, MSc, University of British Columbia, Room 211, 1033 Davie Street, Vancouver, British Columbia, Canada. Email: zlaksman@mail.ubc.ca

*M. Cheung and A. Husain contributed equally.

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Table 1. Overview of Screening Practices Among Survey Respondents (n=23)

Survey question	Survey response, n (%)
AF	
Routine screening for all patients with AF	20 (87)
Frequency of routine AF screening‡	At initial evaluation, 16 (70)
	Once per y, 14 (61)
	Once every 2 y, 2 (9)
	When symptoms are suggestive, 16 (52)
	Every 3–4 y, 2 (9)
Consider LA dilatation as a factor to screening	18 (78)
Minimum degree of LA dilatation required to prompt more frequent AF screening	Mild, 4 (17)
	Moderate, 8 (35)
	Severe, 3 (13)
	LA dilatation does not determine the frequency of my AF screening, 8 (35)
Factors to prompt increased frequency of screening‡	Severe mitral regurgitation, 14 (61)
	NYHA class III to IV, 10 (43)
	Dynamic LV outflow tract obstruction, 9 (19)
Follow-up screening if AF reported on consumer wearable device	21 (91)
Preferred methods of screening in patients with HCM‡	24- to 48-h Holter monitor, 21 (91)
	7- to 14-d Holter monitoring, 16 (70)
	Consumer wearable devices (eg, Apple Watch, FitBit, AliveCor), 13 (57)
Anticoagulation of all patients with HCM who have subclinical AF (regardless of duration)	21 (91)
Anticoagulation of patients with HCM who have apical aneurysm/pouch‡	Patients with AF, 17 (74)
	Patients with thrombus in LV apical aneurysm, 17 (74)
	Patients with prior stroke/TIA, 14 (61)
Postoperative AF anticoagulation in patients with HCM‡	For 3 mo if no recurrence on Holter, 9 (39)
	For 3 mo if no recurrence on clinical presentation, 6 (26)
	For 3 mo if no recurrence on loop monitor, 1 (4)
	Indefinitely, 2 (9)
	Under specific circumstances, 4 (17)
	Never, 1 (4)
Preferred anticoagulant	DOAC, 18 (78)
	Either DOAC or warfarin, 3 (13)
First-line antiarrhythmic‡	Amiodarone, 22 (96)
	Sotalol, 15 (65)
	Disopyramide, 9 (39)
Ablation treatment for AF in patients with HCM	First-line, 4 (17)
	Not first-line 10 (44)
	Only under special circumstances,* 9 (39)
Nonsustained ventricular tachycardia	
Screening in patients with HCM	23 (100)
Preferred screening methods‡	24- to 48-h Holter monitor, 21 (91)
	>48-h/prolonged Holter, 14 (61)
	Permanent pacemaker when available, 12 (52)
	ICD, 11 (48)
	Implantable loop recorder, 9 (39)
	Exercise stress testing, 8 (35)

(*Continued*)

Table 1. Continued

Survey question	Survey response, n (%)				
Frequency of NSVT screening‡	At initial evaluation, 17 (74)				
	Annually, 15 (65)				
	When symptoms are suggestive of NSVT, 16 (70)				
	Every other year, 3 (13)				
	Other 3 (13)†				
Preferred devices for prolonged NSVT monitoring in patients without an ICD or permanent pacemaker‡	Prolonged Holter monitor (7–14 da), 21 (78)				
	Event/loop recorder (30 d), 13 (57)				
	Implantable loop recorder, 9 (39)				
	None of the above, 4 (17)				
Top 5 factors prompting routine prolonged (7–14 d) Holter monitoring for NSVT‡	Symptoms (palpitations, presyncope, syncope, 16 (70)				
	LGE on CMR imaging: moderate LGE 8 (35), severe (>15), 8 (35)				
	Apical pouch/aneurysm, 8 (35)				
	Maximal wall thickness >30 mm, 7 (30)				
	Family history of sudden cardiac death, 7 (30)				
Top 4 features prompting consideration of an ICD in patients with HCM whose only AHA/ACC SCD risk factor is NSVT‡	Younger age (<35 y), 16 (70)				
	Rate of NSVT episode, 19 (83)				
	Frequency of NSVT episodes, 18 (78)				
	Length of NSVT episodes, 18 (78)				
Evaluating the combination of rate and duration of NSVT episodes that would increase the probability of offering an ICD for primary prevention§					
Duration of NSVT	≥3 beats	>7 beats	>10 beats	I do NOT consider this rate to be high risk regardless of duration	I consider this rate high risk regardless of duration
Rate of NSVT (beats per min)	120–149	3 (15)	1 (5)	9 (45)	2 (10)
	150–199	5 (24)	4 (19)	1 (5)	2 (10)
	>200	7 (33)	8 (38)	1 (5)	3 (14)

AF indicates atrial fibrillation; AHA/ACC, American Heart Association/American College of Cardiology; CMR, cardiac magnetic resonance; DOAC, direct oral anticoagulant; ICD, implantable cardioverter-defibrillator; LA, left atrial; LV, left ventricular; NSVT, nonsustained ventricular tachycardia; NYHA, New York Heart Association; SCD, sudden cardiac death; and TIA, transient ischemic attack.

* Special circumstances include nonobstructive hypertrophic cardiomyopathy (HCM), younger patients, or failed medical treatment.

†Other practices include twice a year if there is moderate or severe late gadolinium enhancement (LGE), every 3 to 4 years with Holter monitor, and the gradual reduction of screening as patients get over the age of 50.

‡This question was a "Select all that apply," allowing for multiple responses from a respondent.

§Responses to this question were missing or incomplete for 3 participants.

pursue further screening if a patient reported AF on these devices. Only 17% considered ablation as first-line therapy.

Most respondents (91%) would recommend anticoagulation for all patients with HCM who have subclinical AF (SCAF) regardless of duration. The majority (69%) recommended 3 months of anticoagulation for isolated postoperative AF (including postseptal myectomy) in patients without recurrence. In patients with an apical aneurysm or pouch, anticoagulation was only considered if the patient had AF (74%), a thrombus in the left ventricular apical aneurysm (74%), or prior stroke/transient ischemic attack (61%).

All respondents screen patients with HCM for NSVT. Most (96%) did not recommend a primary-prevention ICD in patients with HCM who have NSVT without additional risk factors. When considering use of an ICD, 35% considered one episode of NSVT sufficient, whereas 65% required at least ≥2 episodes of NSVT on 24- to 48-hour Holter. Results were heterogenous regarding the minimum rate of NSVT episode to prompt ICD consideration (39% selected >200 beats per minute, 33% selected >150 beats per minute, and 17% selected 120 beats per minute).

This study provides unique insights into the practice of expert HCM comprehensive care centers when considering optimal screening and management of AF and NSVT in patients with HCM. There was general alignment with guidelines when available and often agreement in other areas despite a paucity of data. For example, left atrial dilation led to increased screening for AF, consistent with the HCM 2020 American Heart Association/American College of Cardiology (AHA/ACC) guidelines,[1] which recommend extended screening in the presence of additional risk factors. Most experts recommended anticoagulation in all patients with HCM who have SCAF regardless of duration, although evidence for anticoagulation in shorter

SCAF (<24 hours) is lacking. Current evidence regarding anticoagulation in SCAF does not directly address the HCM population despite their increased risk of thromboembolism. Despite growing evidence supporting early AF ablation in the non-HCM population, few respondents would refer patients with HCM for AF ablation as an early management strategy.

This study also highlights areas of important practice heterogeneity, including the management of anticoagulation for postoperative AF in patients with HCM, which is not addressed by current AHA/ACC guidelines. Most respondents did not recommend long-term anticoagulation beyond 3 months for isolated postoperative AF. The role of anticoagulation for patients with HCM who have an apical aneurysm also varied considerably.

Modalities and frequency of outpatient ECG monitoring were also inconsistent, as were thresholds for primary prevention ICDs in patients with asymptomatic NSVT, highlighting gaps in current guidelines. While most agreed that patients with HCM and NSVT should not be considered for primary-prevention ICDs without additional risk factors, younger patients and those with faster, longer, and more frequent episodes were more likely to be considered for an ICD.

Heterogeneity in practice exists between HCM comprehensive care centers regarding the management of AF and NSVT. More studies are needed to guide the management of SCAF and postoperative AF and the role of anticoagulation for apical aneurysms. Focus should be made to NSVT screening and subsequent management decisions related to detection of NSVT in determining candidacy for a primary-prevention ICD in patients with HCM.

ARTICLE INFORMATION

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Affiliations

Division of Cardiology, Department of Medicine, Faculty of Medicine, University of British Columbia, Vancouver, British Columbia, Canada (M.C., A.H., D.D., C.O.L., J.P., K.O., Z.L.); Hartford HealthCare, Heart and Vascular Institute, Hartford, CT (A.W.); and Department of Cardiovascular Medicine, Mayo Clinic, Rochester, MN (J.B.G.).

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