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Current practice in Europe: how do we manage patients with ventricular tachycardia? European Heart Rhythm Association survey

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The purpose of the EP wire is to examine the clinical practice in the management of sustained ventricular tachycardia (VT), with special focus on diagnostic and therapeutic strategies. Forty-five European centres, all members of the EHRA-EP Research network completed the questions of the survey. There was an equal distribution of centres with high, medium, and low volume of activity. The most common aetiologies were: post-myocardial infarction ischaemic heart disease (55%), followed by idiopathic dilated cardiomyopathy (18%), and idiopathic VT (11%) and others (12%). Cardiac magnetic resonance imaging was performed in more than 50% of patients in 24 centres (62.2%). Invasive electrophysiological study was performed in more than 70% of patients in 16 centres (35.6%), between 51 and 70% in 9 (20%), below 50% in 20 (44.5%). In 39 centres (86.7%), implantable cardioverter defibrillator implantation was considered in all patients with structural heart disease and left ventricular ejection fraction <35%. In the setting of secondary prevention, early radiofrequency ablation of the VT was performed in more than 50% of the patients in only five centres (11.4%). Sequential endo-epicardial approach was reported in 52.2% of centres.

Keywords Ventricular tachycardia • EHRA survey

Introduction

Ventricular tachycardia (VT) is a complex arrhythmic syndrome including different aetiologies. The management of patients suffering from VT includes invasive and non-invasive diagnostic modalities and non-pharmacological therapies, mainly implantable cardioverter defibrillator (ICD) and radiofrequency ablation (RFA). The aim of this EP wire was to obtain insight into the current management of patients with sustained VT in several European Countries.

Results

Responses were received from 45 partners of the European Heart Rhythm Association Research Network. There was a wide geographic distribution with responses from 20 countries (9 centres from Italy, 6 from Spain, 5 each from Belgium and Greece, 3 from United Kingdom, 2 each from France, the Netherlands and Switzerland, and 1 centre from 11 other countries).

The number of patients who were treated in 2011 for episodes of sustained ventricular tachycardia (VT) was equally distributed between centres of high, medium, and low volume of activity. In particular, nine centres (20%) treated >100 patients in 2011, 11 centres (24.4%) between 51 and 100, 13 centres (28.9%) between 21 and 50, and 12 centres (26%) <20.

The most common aetiology of the underlying heart disease was post-myocardial infarction ischaemic heart disease (55%), followed by idiopathic dilated cardiomyopathy (18%), idiopathic VT (11%), arrhythmogenic right ventricular disease (5%), valvular disease (4%), hypertrophic cardiomyopathy (4%), channelopathies (4%), and rare forms such as infiltrative cardiomyopathies (2%).

Within the idiopathic forms, the VT origin from the outflow tract of the right ventricle is reported by 69% of patients, from the outflow tract of the left ventricle or the aortic cusps in 19%,

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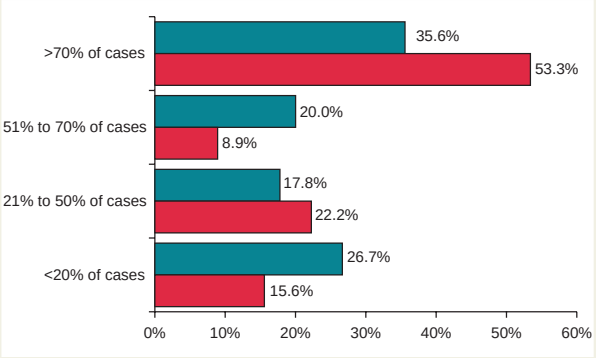

Figure 1 Distribution of EP wire collaborating centres by percentage of patients evaluate by cardiac MRI (red bar) and off-drug electrophysiological study (dark green bar).

from the left ventricular fascicles in 9%, and from other less frequent sites in 10% of cases.

To better define any structural and/or functional abnormalities, cardiac magnetic resonance imaging (MRI) was performed in >70% of the observed patients in 24 of the 45 centres (53.3%), between 51 and 70% of the patients in 4 centres (8.9%), between 21 and 50% in 10 (22.2%), and in <20% of cases in 7 (15.6%) (*Figure 1*).

The right and/or left ventricular endomyocardial biopsy was performed in <5% of patients in 34 centres (75.6%), between 6 and 20% of patients in 9 (20%), between 21 and 50% in one centre (2.2%), and in >50% of cases in the last centre (2.2%).

Off-antiarrhythmic drugs invasive electrophysiological study was performed in >70% of patients in 16 centres (35.6%), between 51 and 70% in 9 (20%), between 21 and 50% in 8 (17.8%), and in <20% in 12 (26.7%) (*Figure 1*). Electrophysiological study was judged to be important for the evaluation of ventricular electrical vulnerability in 30 centres (66.7%), for the efficacy of antiarrhythmic drugs in only 4 centres (8.9%), for optimizing ICD programming in 5 (11.1%), and for selection of candidates for catheter ablation in 34 (75.6%).

In 39 centres (86.7%), ICD implantation was considered in all patients with structural heart disease and low left ventricular ejection fraction (LVEF), regardless of the severity of symptoms associated with VT. In contrast, in six centres (13.3%), the main indication for ICD therapy was presentation with syncope or life-threatening symptoms associated with VT.

In patients treated with ICD, VT detection zones initially included a single VT window in 10 centres (22.2%), two VT windows for slow and fast VT in 35 (77.8%). A long VT detection interval (≥5 s or ≥24 impulses) was programmed in 23 of the 45 centres (51.1%) and a short detection interval (≤2.5 s or <12–16 impulses) in only two centres (4.4%).

Antitachycardia pacing (ATP) therapy in the VT window was empirically programmed in 41 of the 45 centres (93.2%), it was based on the result of the electrophysiological study in 2 (4.5%) and only after eventual clinical VT recurrence in 1 (2.3%).

In patients treated with ICD in the setting of secondary prevention, RFA of the VT was performed during the same hospitalization of ICD implantation, in >50% of the patients in only 5 centres (11.4%), between 21 and 50% in 2 (4.5%), and in <20% of the patients in 17 (38.6%).

A limited VT circuit RFA based on entrainment, pace-mapping, and earliest activation detection in patients with refractory VT and ischaemic and non-ischaemic cardiomyopathy was considered as first-line therapy in all cases in 13 centres (29.5%), in selected cases in 12 (27.3%), and associated with a more extensive ablation of the myocardial substrate in 19 (43.2%). An extensive RFA targeting every area with abnormal signals in sinus rhythm has been considered as first approach in all patients in 11 centres (25.5%), only in those without VT inducibility in 13 (29.5%), and/or in patients with haemodynamically tolerated VT in 20 (45%).

In patients with ischaemic and non-ischaemic cardiomyopathy suffering from refractory VT or electrical storm despite optimal medical treatment, only endocardial approach has been used in 13 centres (29.5%), endocardial approach initially and in case of recurrent VT also epicardial in 21 (47.7%), and initially combined endo-epicardial approach in two (4.5%). Eight centres (18.2%) referred the candidates to RFA to specialized hospitals.

The success rate of RFA of different types of VT, defined by significant shock reduction at 1 year of follow-up, was 68% in patients with previous myocardial infarction, 52% in patients with non-ischaemic dilated cardiomyopathy, 79% in patients with idiopathic out-flow tract and aortic cusps VT, 72% in the other idiopathic VTs.

Discussion

Ventricular tachycardia is an important cause of mortality and morbidity in a wide variety of heart diseases.

The findings of the survey dedicated to the management of sustained VT in 45 European centres can be summarized as follows:

(1) Underlying heart disease was represented mainly by coronary artery disease and non-ischaemic dilated cardiomyopathy, similarly to the aetiology of patients enrolled in the ICD registries.[1–5] According to the literature data, outflow tract VTs are the more frequent idiopathic forms, followed by fascicular VT. [1]

(2) Cardiac MRI was frequently performed in most centres. Previous studies have indeed demonstrated the incremental diagnostic value of cardiac MRI, inclusive of tissue characterization, for the detection of myocardial substrate in patients with ventricular arrhythmias.[6,7] In addition, scar information obtained by cardiac MRI can help to plan an appropriate mapping and ablation strategy (endocardial vs. epicardial approach) and may be imported into the electroanatomic mapping system to facilitate the mapping and ablation procedure itself.

(3) Electro electrophysiological study was recommended in the majority of centres in order to evaluate the baseline ventricular vulnerability and to select the best candidates to RFA.[1,8,9]

(4) Implantable cardioverter defibrillators are largely used in patients with organic heart disease who survived sustained-VT non attributable to a transient correctable cause, independently of the related symptoms. The programming of ATP therapy in one or two VT detection windows and of long VT detection interval was recommended in the majority of centres,

considering the unfavourable haemodynamic effects of ICD shocks for frequent or incessant VT. Implantable cardioverter defibrillatorshocks can cause haemodynamic deterioration due to the damage of myocardial cells, and have been associated with mortality in *post hoc* analysis of ICD trials. PREPARE study[10] demonstrated that in primary prevention setting a long VT detection interval associated to ATP can safely reduce the number of patients needing ICD shocks and RELEVANT study[11] found that in a non-ischaemic patients treated for primary prevention with a CRT-D device the overall burden of shocks was lower in patients with a long detection interval. Similar results have also been confirmed by the recent MADIT-RIT results.[12]

(5) Radiofrequency ablation of the VT substrate and circuits was mainly indicated in patients with several recurrences of VT in order to reduce the negative effects of ICD interventions.[3,9,13] This strategy was based on the results of two randomized trials. The SMASH-VT study[14] enrolled patients with unstable and inducible VT, showing a significant decrease in appropriate ICD therapy and electrical storms in the ablation group. The VTACH study[15] assessed the role of VT ablation in patients with prior myocardial infarction and stable VT. A better rate of survival free of recurrent VT was demonstrated in the ablation group, particularly in patients with LVEF $>$ 30%. However, in both studies RFA of the VT substrate had no significant impact of mortality. Outcomes for VT due to non-ischaemic cardiomyopathies are less well evidenced because the VT substrate is more variable and may require epicardial ablation with additional risk. Such an approach was mainly indicated in the EP survey after ineffectiveness of initial endocardial approach.[2,9,16,17]

Conclusion

The current practice in VT management EP wire demonstrates that the majority of participating European centres implement cardiac MRI and electrophysiological study in the diagnostic work-up of the patients with sustained VT. Moreover, in patients treated by ICD ATP programming was strongly considered in order to avoid the unfavourable effects of ICD shocks.

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