ISSN 2305-3127 (Print)•2664-3790 (Online). Кардіохірургія та інтервенційна кардіологія. 2024; Том 13, № 3. С. 26–33



UDC 616.127-005.4-091

DOI: http://doi.org/10.31928/2664-3790-2024.3.2633

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# Predictors of recurrence of ventricular tachycardia and the effectiveness of endocardial ablation at the patients with sudden cardiac death and history of myocardial infarction

**The aim** – to assess predictors of recurrence of ventricular tachycardia after the procedure of endocardial ablation in patients with an episode of cardiac arrest and history of myocardial infarction.

**Materials and methods.** The work included 32 patients (average age 52.9 ± 5.6 years, 27 (84.3 %) men and 5 (15.6 %) women). Including criteria were: an episode of cardiac arrest with successful resuscitation, history of myocardial infarction, procedure of endocardial mapping with ablation the substrate of tachyarrhythmia. The duration of observation was 12 months. Patients were examined according to the guidelines of the diagnosis in patients with ventricular tachycardia. The endpoint was the recurrence of VT at the time of the patient's last visit. Quantitative indicators are presented as mean ± standard deviation.

**Results.** At 12 months after the procedure, the following parameters were associated with relapses of ventricular tachycardia with the greatest statistical significance: left ventricular systolic dysfunction (additive relative risk (ARR) – 43.0 %, relative risk (RR) – 2.57 [1.14–5.82], odds ratio (OR) – 6.50 [7.00–30.70], $p < 0.05$), arterial hypertension (ARR – 41.0 %, RR – 2.75 [1.08–6.90], OR – 5.96 [1.33–26.70], $p < 0.05$), diabetes mellitus (ARR – 43.0 %, RR – 2.83 [1.10–7.30], OR – 6.50 [1.25–33.60], $p < 0.05$), duration of arrhythmic history (ARR – 40.0 %, OR – 5.71 [7.00–28.10], $p < 0.05$), electrical storm episode at the time of ablation (ARR – 38.0 %, RR – 1.89 [1.27–4.99], OR – 8.57 [7.00–51.50], $p < 0.05$). Atrial fibrillation (ARR – 25.0 %, RR – 1.58 [0.76–3.25], OR – 2.73 [7.00–17.60], $p < 0.05$), age younger than 45 years (ARR – 15.0 %, RR – 1.37 [0.60–3.07], OR – 1.78 [7.00–7.47], $p < 0.05$), and chronic obstructive pulmonary disease (ARR – 18.0 %, RR – 1.46 [0.71–2.99], OR – 2.10 [7.00–9.01], $p < 0.05$) were at the limit of probability with reliable odds ratio. Recurrent VT was recorded more often in patients with partial intraoperative effect than in those with complete effect (26.7 % versus 5.9 % of patients, $p < 0.05$). Recurrences of VT were also more common in patients with larger number of radiofrequency ablation procedures in the history (46.7 % versus 5.9 %). A significant risk factor for a recurrent episode of tachycardia was also the duration of corrected QT-interval (QTc, ms) and the presence of late potentials from the epicardial surface of the left ventricle. In the multivariate model, all the above-mentioned parameters were tested, while the only factor independently associated with VT recurrence was the fact of an electrical storm at the time of ablation (risk ratio 5.78; 95 % CI: 1.16–19.4; $p = 0.02$).

**Conclusions.** Factors associated with an increased risk of recurrence of ventricular tachyarrhythmias in patients after a heart attack and an episode of sudden death include left ventricular systolic dysfunction, arterial hypertension, diabetes mellitus, and duration of an arrhythmic history. The presence of an electrical storm is an independent predictor of VT relapse when observed up to 12 months after endocardial ablation.

**Key words:** ventricular tachycardia, recurrence, endocardial ablation, sudden cardiac death, myocardial infarction.

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Стаття надійшла до редакції 30 травня 2024 року

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Received on May 30, 2024

Sudden cardiac death (SCD) is one of the most important health care problems, accounting for 20 % of total mortality and 50 % of cardiovascular mortality in the United States and countries of the European Union [21, 25]. Myocardial infarction and its complications, such as cardiogenic shock, pulmonary edema, heart rhythm disorders and their combination can also be a cause of SCD [7]. The risk factors of SCD are also myocarditis, heart conduction disorders of unknown etiology (complete atrioventricular block), prolonged Q-T syndrome, mitral valve prolapse [17]. In 80–90 % of cases, cardiac arrest is caused by the occurrence of ventricular fibrillation or sustained ventricular tachycardia [4, 14, 16]. SCD in young and middle age is observed in men 4 times more often than in women [18].

In Ukraine, the 2022 Recommendations of the European Society of Cardiology are used as a working document for the management of this clinical condition [24, 25]. In addition to antiarrhythmic therapy, cardioverter defibrillators are mostly used to prevent SCD in patients with ventricular tachycardias. If the pharmacological approach is ineffective, catheter modification of arrhythmogenic zones of the ventricular myocardium is used to relieve and prevent relapses of ventricular tachyarrhythmias. The superiority of radiofrequency catheter ablation compared to the medical treatment of VT has been demonstrated in individual clinical trials and a meta-analysis combining the results of studies up to 2019 [5, 8, 20].

The effectiveness of endocardial catheter ablation of the VT substrate varies in patients with different nosology of structural myocardial damage, which, in some cases, is due to the deep (subepicardial) location of the critical zone of tachycardia and limited depth of penetration of radiofrequency (RF) exposure during endocardial applications. Thus, the depth of RF damage reaches 6–8 mm according to various authors [12, 20].

Catheter ablation plays a vital role in the treatment of post-infarction VT. According to the results of the multicenter randomized trial VTACH, it was shown that ablation of the VT substrate in post-infarction patients reduces the risk of developing recurrent VT, increases the duration of the period until the first recurrence of VT, and this patient management strategy is preferable compared to isolated ICD implantation [10]. Thus, after 2 years, in the ablation group, 47 % of patients had no recurrence of VT, while in the ICD implantation group, only 29 % of patients had no recurrence of VT. Also, the multicenter randomized trial VANISH showed the advantage of radiofrequency ablation in the prevention of recurrent VT, ICD activation, and the development of electrical storm compared with intensification of drug antiarrhythmic therapy in patients with ischemic VT [9]. The SMASH-VT trial showed that catheter ablation significantly reduced the rate of ICD activation due to recurrent VT [23].

In consequence, it seems relevant to study the presence and prevalence of the subepicardial electrophysiological substrate of VT in structural heart diseases, predictors of the effectiveness of endo- and epicardial ablation of VT, as well as additional diagnostic criteria for diseases.

**The aim** – to evaluate the predictors of recurrence of ventricular tachycardia after the procedure of endocardial ablation in patients with an episode of cardiac arrest and history of myocardial infarction.

## Materials and methods

This study is a prospective, observational, non-randomized study with consecutive enrollment of patients. The work included 32 patients (average age 52.9 ± 5.6 years, 27 (84.3 %) men and 5 (15.6 %) women) after an episode of cardiac arrest with successful resuscitation, after a history of myocardial infarction. All patients underwent an initial cardiologic evaluation which included coronary angiography, ventriculography and appropriate hemodynamic measurements. After that the endocardial mapping with ablation of the substrate of ventricular tachyarrhythmia was made.

The inclusion criteria were following: an episode of cardiac arrest with successful resuscitation; presence of indications for ablation of the substrate of ventricular tachyarrhythmia with a history of myocardial infarction; all stages and phenotypes of heart failure; written consent of the patient to participate in a prospective study.

Criteria for non-inclusion of patients: unstable angina or less than 30 days since myocardial infarction; patients with post-infarction cardiosclerosis, in case, when the anatomy of the coronary arteries was unknown; the presence of coronary artery stenosis requiring revascularization; the presence of a mobile left ventricular thrombus according to echocardiography or computed tomography; active infectious process; a history of implantation the cardioverter-defibrillator; a history of heart valve replacement.

The diagnosis of myocardial infarction was established according to the Fourth Universal Definition of Myocardial Infarction. All patients were undergoing emergency coronary angiogra-

phy and percutaneous coronary revascularization after primary stabilization of hemodynamics (1.80 ± 0.23 days). Endocardial ablation was provided in post-infarct period – 28.00 ± 2.68 days after cardiac arrest episode.

Patients were examined in accordance with current guidelines (resting ECG, echocardiography, 24-hour ECG monitoring).

The primary endpoint was a recurrence of VT at the time of the patient's last visit in the form of symptomatic persistent paroxysms or short-time paroxysms registered with ECG monitoring. Secondary endpoints included overall intraoperative ablation effect (no induction of any VT), number of repeat procedures, procedure-related adverse events, and death.

Electrophysiological studies, tachycardia substrate mapping, and radiofrequency catheter ablation were performed. For endocardial access to the right ventricle, femoral vein puncture was performed using the Seldinger's technique. The procedure was performed using the CARTO 3 non-fluoroscopic navigation system.

Stimulation mapping of potential conduction channels inside scars and zones of entry and exit of tachycardias from scar areas and areas of registration of late and fragmented potentials was carried out. In the case of induction of sustained and hemodynamically tolerable VT, entrainment mapping was performed (stimulation with advance of the VT cycle and assessment of stimulus-QRS intervals, post-stimulation interval to local potential).

After radiofrequency catheter modification, SMECG was monitored in the first three days after surgery in the hospital, then patients underwent follow-up visits. The period of observation consisted 12 months.

For the statistical analysis of the obtained results, we used the package of data processing programs Statistica for Windows version 7.0 (Stat Soft inc., USA). As categorical indicators are used frequencies and percentages of the total number of observations. Quantitative indicators were tested for normality using the Kolmogorov – Smirnov test. Data are described as mean ± standard deviation (M ± SD) in case of normal distribution. For categorical variables, χ-square analysis was performed. The univariate analysis and assessment of the risk of an adverse event was carried out taking into account the absolute (AR) and relative (RR) risks, as well as the odds ratio (OR), additive relative risk (ARR) and 95 % confidence interval. At $p < 0.05$, differences were considered statistically significant.

## Results

Concomitant pathology was represented by hypertension in the majority of patients (17 people, 53.1 % of patients), diabetes mellitus in 12 (37.5 %), chronic obstructive pulmonary disease in 7 (21.8 %). 6 (18.8 %) patients had a non-paroxysmal form of atrial fibrillation; 10 patients (31.2 %) had a history of electrical storm. Manifestations of chronic heart failure II–IV class (NYHA) were noted in 16 patients (50 %), while 6 of them (18.8 %) had class II (NYHA). Left ventricular systolic dysfunction was diagnosed in 14 patients.

The most frequent localization of the post-infarction scar was on the lower wall (22 persons, 68.8 %) and side (18 persons, 56.3 %) walls. In the area of the left ventricle septum, a post-infarction scar was diagnosed in 10 cases (31.3 %). The least common localization were changes of the apex in 5 cases (15.6 %) and front wall (5 people, 15.6 %).

When comparing maps of registration of bipolar and unipolar signals on the endocardial surface of the left ventricular myocardium, a predominance of the median area of low-amplitude myocardium on unipolar maps compared to bipolar ones was revealed (42.4 ± 16.1 $cm^2$ versus 13.9 ± 6.9 $cm^2$, $p < 0.001$).

Among patients with mapping analysis, in only one case the area of arrhythmogenic substrate on the bipolar signal recording map exceeded that on the unipolar signal recording map by 2.5 times on the endocardial surface. In one patient, the area of registration of altered activity was small (2.6 $cm^2$), and there was no predominance of the area of low-amplitude myocardium on the unipolar map. The area where late potentials were recorded, marked with corresponding points on the map, was assessed as a potentially arrhythmogenic zone.

The average duration of the intervention was 228 ± 62 minutes, the average duration of fluoroscopy was 45 ± 21 minutes. In 30 patients, at the end of the intervention, a complete intraoperative effect was achieved, that is, ventricular tachycardia was not induced, of which in two, aggressive stimulation induced ventricular fibrillation, which was relieved by external defibrillation. Thus, in 30 of 32 (93.8 %) cases, complete acute effectiveness of ablation was achieved.

To assess long-term results, patients were followed up within the protocol. In three patients, no recurrence of ventricular tachyarrhythmia was recorded over a period of 1 year. In 2 patients, relapses of ventricular tachycardia were observed within 1 year after surgery. Paroxysms of ventricular tachycardia were stopped by anti-

Table 1
**Clinical characteristics of patients with and without relapses of ventricular tachycardia after catheter ablation**

| Parameters | Relapse (n = 15) | No relapse (n = 17) | p |
|---|---|---|---|
| Sex<br>men<br>women | <br>14 (52.0 %)<br>1 (20.0 %) | <br>13 (48.0 %)<br>4 (80.0 %) | <br>>0.05<br><0.05 |
| Arterial hypertension | 11 (65.0 %) | 6 (35.0 %) | <0.05 |
| Diabetes mellitus | 8 (67.0 %) | 4 (33.0 %) | <0.05 |
| Chronic obstructive pulmonary disease | 7 (58.0 %) | 5 (42.0 %) | <0.05 |
| Atrial fibrillation (persistent and stable form) | 4 (67.0 %) | 2 (33 %) | <0.05 |
| History of electrical storm | 8 (80.0 %) | 2 (20.0 %) | <0.05 |
| The average age at the time of intervention is up to 45 years | 10 (53.0 %) | 9 (47.0 %) | >0.05 |
| The duration of the history of arrhythmia is more than 20 months | 12 (63.0 %) | 7 (37.0 %) | <0.05 |
| LV systolic dysfunction | 10 (71.0 %) | 4 (29.0 %) | <0.05 |

LV – left ventricle.

Table 2
**Some electrophysiological parameters at patients with myocardial infarction and cardiac arrest in 12 months of observation**

| Parameters | Relapse (n = 15) | No relapse (n = 17) | p |
|---|---|---|---|
| QRS, ms (sinus rhythm) | 106.0 ± 13.2 | 97.0 ± 11.9 | >0.05 |
| QTc, ms (sinus rhythm) | 411.0 ± 17.8 | 461.0 ± 28.9 | <0.05 |
| Partial effect of ablation | 4 (26.7 %) | 1 (5.9 %) | <0.05 |
| Late spike the epicardial surface | 13 (86.7 %) | 7 (41.2 %) | <0.05 |
| More than one ablation in anamnesis | 7 (46.7 %) | 1 (5.9 %) | <0.05 |

tachycardia stimulation; 1 shock was caused due to acceleration of VT to ventricular fibrillation.

By 12 months after catheter ablation of the substrate, the episode of recurrent VT was more common in patients with the greatest number of previous attempts at radiofrequency modification of the arrhythmogenic substrate in the anamnesis.

*Table 1* shows the clinical characteristics of patients with and without recurrence of ventricular tachycardia after catheter ablation. Gender and age characteristics, duration of arrhythmia history, presence of concomitant diseases, verified left ventricular systolic dysfunction, and a history of electrical storm were determined as risk factors.

In 12 months after the procedure, recurrent VT was recorded more often in patients with partial intraoperative effect than in those with complete effect (26.7 % versus 5.9 % of patients, $p < 0.05$). Recurrences of VT were also more common in patients with a large number of radiofrequency ablation in the history (46.7 % versus 5.9 %). Also as a significant risk factor for a recurrent episode of tachycardia was the duration of the corrected QT interval (QTc, ms) and the late potentials from the epicardial surface of the left ventricle, *table. 2.*

At 12 months after the procedure, the following parameters were associated with recurrences of ventricular tachycardia with statistical significance: left ventricular systolic dysfunction (ARR – 43.0 %, RR – 2.57 [1.14–5.82], odds ratio (OR) – 6.5 [7.0–30.7]), arterial hypertension (ARR – 41.0 %, RR – 2.75 [1.08–6.90], OR – 5.96 [1.33–26.70]), diabetes mellitus (ARR – 43.0 %, RR – 2.83 [1.10–7.30], OR – 6.50 [1.25–33.60]), duration of arrhythmic history (ARR – 40.0 %, RR – 2.74 [0.95–7.83], OR – 5.71 [7.00–28.10]), an

Table 3
**Absolute and relative risk, odds ratio of the developing of recurrence of ventricular tachycardia depending on the initial clinical characteristics of patients**

| Parameters | AR, % | RR [CI % 95] | OR [CI % 95] |
|---|---|---|---|
| Gender | | | |
| Male | 52.0 | 2.59 [0.43–15.50] p > 0.05 | 4.31 [0.42–43.80] p > 0.05 |
| Female | 20.0 | | |
| Arterial hypertension | | | |
| Verified | 65.0 | 2.75 [1.08–6.90] p < 0.05 | 5.96 [1.33–26.70] p < 0.05 |
| Non-verified | 24.0 | | |
| Diabetes mellitus | | | |
| Verified | 67.0 | 2.83 [1.10–7.30] p < 0.05 | 6.50 [1.25–33.60] p < 0.05 |
| Non-verified | 24.0 | | |
| Chronic obstructive pulmonary disease | | | |
| Verified | 58.0 | 1.46 [0.71–2.99] p > 0.05 | 2.10 [7.00–9.01] p < 0.05 |
| Non-verified | 40.0 | | |
| Atrial fibrillation | | | |
| Verified | 67.0 | 1.58 [0.76–3.25] p > 0.05 | 2.73 [7.00–17.60] p < 0.05 |
| Non-verified | 42.0 | | |
| Electrical storm | | | |
| Verified | 80.0 | 1.89 [1.27–4.99] p < 0.05 | 8.57 [7.00–51.50] p < 0.05 |
| Non-verified | 42.0 | | |
| Age less than 45 years | | | |
| Verified | 53.0 | 1.37 [0.60–3.07] p > 0.05 | 1.78 [7.00–7.47] p < 0.05 |
| Non-verified | 38.0 | | |
| Duration of arrythmia more than 20 months | | | |
| Verified | 63.0 | 2.74 [0.95–7.83] p > 0.05 | 5.71 [7.00–28.10] |
| Non-verified | 23.0 | | |
| Systolic dysfunction of left ventricle | | | |
| Verified | 71.0 | 2.57 [1.14–5.82] p < 0.05 | 6.50 [7.00–30.70] p < 0.05 |
| Non-verified | 28.0 | | |

AR – absolute risk; RR – relative risk; OR – odds ratio; CS – confidence interval.

episode of electrical storm at the time of ablation (ARR – 38.0 %, RR – 1.89 [1.27–4.99], OR – 8.57 [7.00–51.50]), *table 3*.

Some clinical facts wre on the edge of probability with reliable parameters of odds ratio, such as atrial fibrillation (ARR – 25.0 %, RR – 1.58 [0.76–3.25], OR – 2.73 [7.00–17.60]), age younger than 45 years (ARR – 15.0 %, RR – 1.37 [0.60–3.07], OR – 1.78 [7.00–7.47]), and the presence of chronic obstructive pulmonary disease (ARR – 18.0 %, RR – 1.46 [0.71–2.99], OR – 2.10 [7.00–9,01]).

In the multivariate model, all the above-mentioned parameters were tested, while the only factor independently associated with VT recurrence was the fact of an electrical storm at the time of ablation (risk ratio 5.78; 95 % CI: 1.16–19.4; p = 0.02).

## Discussion

The varying effectiveness of catheter ablation of an arrhythmogenic substrate depends on the etiology of the substrate itself. Thus, the effectiveness of ablation of the substrate of post-infarct and non-ischemic VT in the acute period and its significant reduction to 57 % and 40.7 %, respectively, 1 hour after the intervention [3] have been repeatedly emphasized.

The varying effectiveness of catheter ablation of an arrhythmogenic substrate depends on the

etiology of the substrate itself. The effectiveness of ablation of the substrate of post-infarct and non-ischemic VT in the acute period and its significant reduction to 57 % and 40.7 %, respectively, 1 hour after the intervention [19] have been repeatedly emphasized.

An important finding, in our opinion, is the prognostic significance of electrical storm (that is, 3 or more episodes of VT within 24 hours, requiring cardioversion or electrotherapy of ICD) as an indication for index ablation. Patients with a history of electric shock have the highest risk of VT recurrence in the long-term postoperative period. Despite the earlier shown high efficiency of RF catheter ablation as a method of stopping an electric storm [13, 22], the efficiency in the long term appears significantly lower.

The area of the mapped «scar» on the endocardial surface on uni- and bipolar maps, as well as the ratio of these areas, is positioned as a criterion for assessing the prevalence and transmurality of the arrhythmogenic substrate. Previously, researchers attempted to derive the area ratio coefficient, which could serve as a prognostic and/or diagnostic criterion. As a result, A. Müssigbrodt and co-authors demonstrated that the scar area ratio on bi- and unipolar maps ≥ 0.58 was a predictor of recurrence of ventricular tachycardia [15]. Whereas A. Berruezo and co-authors in their work on a larger sample of patients showed that when the ratio of the area of the scar on bipolar and unipolar maps of the endocardial surface is > 0.23, the area of the subepicardial substrate is small and these patients mainly need endocardial modification of the arrhythmogenic substrate [1].

Full intraoperative effect (non-inducibility of any VT) influenced the risk of recurrence of VT: in patients with partial intraoperative effect, arrhythmia recurrences were more often registered 12 months after the intervention compared to patients with full intraoperative effect. This observation corresponds to the results of previously published studies [2, 6, 11]. A meta-analysis of 24 observational studies showed that in patients after an episode of sudden cardiac death, non-inducibility of VT after the ablation procedure is a predictor of the absence of recurrence of tachyarrhythmias. As shown, the results of our work confirm the data available in the literature [11].

**Research limitations.** The limitation of the work was the non-randomized research design, including personalized drug-therapy according to the clinical situation.

## Conclusions

The following clinical and electrophysiological factors associated with an increased risk of recurrence of ventricular tachyarrhythmias have been identified in patients after a heart attack and an episode of sudden death: left ventricular systolic dysfunction, hypertension, diabetes mellitus, duration of an arrhythmic history. In 12 months after the procedure, recurrent VT was registered more often in patients with partial intraoperative effect of ablation and large number of previous attempts. A significant risk factor for a recurrent episode of tachycardia was also the duration of the corrected QT-interval. The presence of an electrical storm (the need to perform 3 or more cardioversions in 24 hours due to recurrent ventricular tachycardia and/or ventricular fibrillation) is an independent predictor of VT relapse after endocardial ablation.

*The authors declare no conflict of interest.*
*Authors contributions: literature review – Ya.S.; writing the text – O.G.*

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# Предиктори рецидиву шлуночкової тахікардії та ефективність ендокардіальної абляції у хворих із раптовою серцевою смертю та інфарктом міокарда в анамнезі

**Мета роботи** – оцінити предиктори рецидиву шлуночкової тахікардії після процедури ендокардіальної абляції в пацієнтів з епізодом зупинки серця та інфарктом міокарда в анамнезі.

**Матеріали і методи.** У дослідження залучили 32 хворих (середній вік (52,9 ± 5,6) року, з них – 27 (84,3 %) чоловіків і 5 (15,6 %) жінок). Критеріями залучення були: епізод зупинки серця з успішною реанімацією, інфаркт міокарда в анамнезі, процедура ендокардіальної абляції. Термін спостереження становив 12 місяців. Хворих обстежували відповідно до чинних рекомендацій. Як кінцеву точку розглядали рецидив епізоду шлуночкової тахікардії. Кількісні показники представили у вигляді середнього ± стандартне відхилення.

**Результати.** Через 12 місяців після процедури ендокардіальної абляції з рецидивами шлуночкової тахікардії були асоційовані такі параметри: систолічна дисфункція лівого шлуночка (адитивний відносний ризик (ARR) – 43,0 %, відносний ризик (RR) – 2,57 [1,14–5,82], відношення шансів (OR) – 6,50 [7,00–30,70], p < 0,05), артеріальна гіпертензія (ARR – 41,0 %, RR – 2,75 [1,08–6,90], OR – 5,96 [1,33–26,70], p < 0,05), цукровий діабет (ARR – 43,0 %, RR – 2,83 [1,10–7,30], OR – 6,50 [1,25–33,60], p < 0,05), тривалість аритмічного анамнезу (ARR – 40,0 %,OR – 5,71 [7,00–28,10], p < 0,05), епізод електричного шторму на момент абляції (ARR – 38,0 %, RR – 1,89 [1,27–4,99], або – 8,57 [7,00–51,50], p < 0,05), фібриляція передсердь (ARR – 25,0 %, RR – 1,58 [0,76–3,25], OR – 2,73 [7,00–17,60], p < 0,05), вік менше ніж 45 років (ARR – 15,0 %, RR – 1,37 [0,60–3,07), OR – 1,78 [7,00–7,47], p < 0,05) та хронічне обструктивне захворювання легень (ARR – 18,0 %, RR – 1,46 [0,71–2,99], OR – 2,10 [7,00–9,01], p < 0,05). Рецидиви шлуночкової тахікардії також частіше реєстрували в пацієнтів із частковим інтраопераційним ефектом порівняно з повним інтраопераційним ефектом (26,7 % проти 5,9 %, p < 0,05) та в пацієнтів з великою кількістю радіочастотних абляцій в анамнезі (46,7 % проти 5,9 %). Суттєвим фактором ризику повторного епізоду тахікардії була тривалість коригованого інтервалу QT (QTc, мс) і наявність пізніх потенціалів з епікардіальної поверхні лівого шлуночка. У багатофакторній моделі єдиним фактором, незалежно пов'язаним із рецидивом шлуночкової тахікардії, був епізод електричного шторму під час абляції (OR – 5,78 [1,16–19,4], p = 0,02).

**Висновки.** Факторами, пов'язаними з підвищеним ризиком рецидиву шлуночкових тахіаритмій у пацієнтів після інфаркту міокарда та епізодом раптової смерті, є систолічна дисфункція лівого шлуночка, артеріальна гіпертензія, цукровий діабет, тривалість аритмічного анамнезу. У багатофакторній моделі наявність електричного шторму є незалежним предиктором рецидиву при тривалому спостереженні.

**Ключові слова:** рецидив шлуночкової тахікардії, ендокардіальна абляція, раптова серцева смерть, інфаркт міокарда.