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ОРИГІНАЛЬНІ ДОСЛІДЖЕННЯ

Postoperative atrial fibrillation after aortic valve replacement in patients with aortic valve regurgitation

The aim – to determine the frequency of postoperative atrial fibrillation (POAF) and risk factors for its development in patients with aortic regurgitation who underwent aortic valve replacement.

Materials and methods. The study included 86 patients with aortic regurgitation who underwent aortic valve replacement. Patients were divided into 2 groups: Group I – 32 people who developed POAF, Group II – 54 patients without arrhythmia. Demographic, preoperative general clinical, instrumental, and electrophysiological indicators, as well as intraoperative and early postoperative parameters in these groups of patients were compared.

Results. Patients in Group I had significantly more hypertension, chronic kidney disease, smoking, and use of median sternotomy. By means of ROC analysis, such predictors of POAF were determined: left atrial diameter, left atrial volume, left atrial volume index (LAVI), LV end-diastolic diameter (LV EDD), LV end-diastolic volume (LV EDV), end-diastolic volume index (EDVI), thyroid-stimulating hormone (TSH) and glomerular filtration rate (GFR), duration of cardiopulmonary bypass, aortic cross-clamp time duration and median sternotomy.

Conclusions. The incidence of POAF in patients with aortic valve regurgitation who underwent aortic valve replacement was 37.2 %. Significant risk factors for POAF in these patients were: hypertension, smoking, left atrial diameter > 45.5 mm, its volume > 92.5 cm^3, LAVI > 44.4 mL/m^2, LV EDD > 63.5 mm, LV EDV > 214.5 mL, EDVI > 106.2 mL/m^2, TSH > 4.75 mU/L and GFR < 99.8 mL/min, duration of cardiopulmonary bypass > 69.5 min, aortic cross-clamp time duration > 50.5 min, duration of operation > 155 min, use of median sternotomy.

Key words: aortic regurgitation, aortic valve replacement, postoperative atrial fibrillation, predictors.

In Ukraine, as in the rest of the world, aortic valve disease is a common cardiac pathology with a frequency of 43–45 % of the total number of heart valve diseases [1]. According to the Strong Heart Study involving 3501 patients aged from 45.8 to 81.6 years, aortic regurgitation was diagnosed in every 9th patient, including mild in 7.7 % of cases, moderate in 3.2 %, and severe in 1.1 % of cases [2]. Aortic regurgitation is the third most common valve disease, accounting for approximately 5 % of interventions for severe valvular heart disease in adults [3]. A study conducted as part of the Framingham Heart Study showed that the prevalence of aortic regurgitation varies significantly depending on the severity of the disease and also increases with age, but begins to decline after the sixth decade of life [4].

The causes of acute severe aortic regurgitation are limited and include aortic dissection, infectious endocarditis, and trauma. In a study including 268 adults who underwent surgery for aortic regurgitation, 18 % of patients had acute valve insufficiency, of which 56 % were associated with active endocarditis and 44 % with acute aortic dissection [5]. Such patients in the vast majority of cases require emergent surgical intervention.

Chronic aortic regurgitation is caused by valve leaflet disease or dilatation of the root and ascending aorta [3]. It can also be caused by infectious and rheumatic endocarditis, traumatic valve damage, and connective tissue diseases.

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It has been established that in industrialized countries, aortic valve regurgitation is most often caused by dilatation of aorta, congenital bicuspid aortic valve, and calcific valve disease, while in countries with limited resources it is caused by rheumatic heart disease [6].

Chronic aortic regurgitation may be asymptomatic for a long time and lead to the development of latent and gradual dilatation, and eventually left ventricular (LV) hypertrophy, decreased contractility, and the formation of heart failure [7]. Aortic valve replacement is performed mainly in patients with severe symptomatic valvular disease, although new data confirm the likely benefit of surgical treatment in patients with severe asymptomatic and even moderate valve disease, which allows to prevent the development of irreversible changes in the LV and achieve optimal long-term results in terms of mortality and morbidity [8].

According to the literature, the development of cardiac surgical techniques, myocardial protection methods and faster recovery of patients in the early postoperative period hasn't been unfortunately accompanied by decrease in the incidence of postoperative atrial fibrillation (POAF) after aortic valve replacement. This is partly due to the increasing of patients' age with more comorbidities and, as a result, a greater risk of postoperative complications. It is known that, depending on the definition and method of diagnosis, POAF is detected with a frequency of 10 % to 50 % with minor changes over the past 2 decades [9].

The occurrence of cardiac arrhythmias in the postoperative period increases the morbidity rate. POAF has been associated with an increased risk of in-hospital stroke in some [10, 11] but not all studies [12]. POAF can lead to such complications as thromboembolism and cardiac arrest, and also associated with increased hospitalization period and mortality [13, 14]. In particular, patients with POAF had a higher risk of death from systemic embolism [15]. In the EXCEL trial, new onset of POAF was an independent predictor of all-cause mortality after 3 years with a rate of 11.4 % compared with 4.3 % in patients without POAF [16].

There are many unresolved issues in the problem of POAF after aortic valve replacement. We believe that improving the understanding of the main risk factors for POAF development will allow to develop the targeted strategies for its early detection and prevention. It will also help to improve the outcomes of treatment for aortic regurgitation.

The aim – to determine the frequency of POAF and risk factors for its development in patients with aortic regurgitation who underwent aortic valve replacement.

Materials and methods

We planned and conducted a prospective one-center cohort study, which included 86 (78 men, 8 women) patients with aortic valve regurgitation aged from 27 to 74 years (mean 50.44±12.72 years) who underwent aortic valve replacement from 2018 to 2022.

Inclusion criteria were:

- age from 18 years;
- a verified diagnosis of aortic valve regurgitation of grade III–IV;
- surgical intervention – aortic valve replacement;
- patient's consent to participate in the study.

Exclusion criteria for the study:

- age less than 18 years;
- the presence of various cardiac rhythm disorders (extrasystolic arrhythmia, atrial fibrillation/flutter, supraventricular tachycardia, sinus node weakness syndrome, etc.) in the anamnesis according to the patient's available medical records;
- stenosis of the coronary arteries > 70 %;
- implanted pacemaker, cardioverter-defibrillator;
- pregnancy;
- patient refusal to participate in the study.

The study was conducted in accordance with the principles of the Helsinki Declaration. The study protocol was approved by the Local Ethics Committee. Informed consent to participate in the study was obtained from all patients.

Patients were divided into 2 groups: Group I – 32 patients who developed POAF, Group II – 54 patients without POAF.

POAF was defined by an electrocardiogram (ECG) as an episode of atrial fibrillation or flutter lasting 30 seconds or more.

Demographic, preoperative general clinical, instrumental, electrophysiological parameters and characteristics of the surgical intervention that could affect the development of cardiac arrhythmias after surgery were compared in both groups.

The statistical analyses of the data were carried out by «SPSS version 21». Data were presented as M±σ (mean ± standard deviation). Student's t-test was used to compare the mean values of independent samples and linked samples. To find differences in frequencies, the Pearson's

chi-square test was used, the odds ratio (OR) and 95 % confidence interval (CI) were determined. Differences between the groups at $p < 0.05$ (95.5 %) were considered statistically significant. ROC analysis was also performed.

Results and discussion

The main clinical, demographic, and anthropometric parameters of patients included in the study are presented in *Table 1*.

It was found that atrial fibrillation after aortic valve replacement developed in 32 of 86 patients with aortic regurgitation, which was 37.2 %.

Tables 2, 3, and *4* show a comparison of Groups I and II in terms of preoperative clinical, laboratory, and instrumental parameters.

As can be seen in *Table 2*, the mean age of patients in Group I was significantly higher – 57.44±10.55 years vs. 46.3±12.13 years in Group II ($p < 0.001$), the frequency of hypertension and chronic kidney disease was higher – 29 (90.6 %)

Table 1
Clinical, demographic, and anthropometric parameters of patients (n = 86)

Indicator	M±σ	Abs. (%)
Male sex, n (%)	–	78 (90.7 %)
Age, years	50.44±12.72	–
Body mass, kg	86.79±17.20	–
Height, cm	176.30±9.15	–
Body mass index, kg/m^2	27.80±4.56	–
Arterial hypertension, n (%)	–	68 (79.1 %)
Chronic coronary syndrome, n (%)	–	14 (16.3 %)
Heart failure (NYHA classification), n (%) Class II Class III	–	 68 (84.5 %) 18 (15.5 %)
Diabetes mellitus, n (%)	–	5 (4.3 %)
Chronic kidney disease, n (%)	–	24 (27.9 %)
COVID-19 in the anamnesis, n (%)	–	29 (24.9 %)
Smoking, n (%)	–	37 (31.8 %)

Table 2
Clinical, demographic, and anthropometric characteristics of patients with and without atrial fibrillation after aortic valve replacement due to aortic valve regurgitation (n = 86)

Indicator	Group I (n = 32)	Group II (n = 54)	p
Male sex, n (%)	30 (93.8 %)	48 (88.9 %)	0.453
Age, years	57.44±10.55	46.30±12.13	<0.001
Body mass, kg	86.56±16.03	86.93±18.01	0.743
Height, sm	176.80±7.71	176.10±9.97	0.925
Body mass index, kg/m^2	27.62±4,06	27.92±4.87	0.77
Hypertension, n (%)	29 (90.6 %)	39 (72.2 %)	0.043
Chronic coronary syndrome, n (%)	6 (18.8 %)	8 (14.8 %)	0.633
Heart failure (NYHA classification), n (%) Class II Class III	 22 (68.7 %) 10 (31.3 %)	 46 (85.2 %) 8 (14.8 %)	 – 0.070
Chronic kidney disease, n (%)	14 (43.7 %)	10 (18.5 %)	0.012
Diabetes mellitus, n (%)	3 (9.4 %)	2 (3.7 %)	0.279
COVID-19 in the anamnesis, n (%)	12 (37.5 %)	17 (31.5 %)	0.568
Smoking, n (%)	22 (68.8 %)	15 (27.8 %)	<0.001

Table 3
Differences between Groups I and II during echocardiographic examination before surgery (n = 86)

Indicator	Group I (n = 32)	Group II (n = 54)	p
Aortic annulus, mm (M±σ)	25.44±1.68	26.20±1.78	0.055
Aortic root diameter, mm (M±σ)	39.25±5.06	39.2±4.8	0.961
Ascending aorta diameter, mm (M±σ)	40.63±4.20	40.87±4.99	0.810
Mitral regurgitation severity, n (%)			
mild	18 (56.3 %)	28 (51.9 %)	0.693
moderate	4 (12.5 %)	4 (7.4 %)	0.432
Tricuspid regurgitation severity, n (%)			
mild	20 (62.5 %)	26 (48.1 %)	0.197
moderate	0	0	–
Systolic pulmonary artery pressure, mmHg (M±σ)	39.8±11.1	35.84±7.44	0.09
Left atrial diameter, sm (M±σ)	46.81±6.17	43.04±6.12	0.007
Left atrial volume, sm^3 (M±σ)	111.30±28.47	88.47±29.69	0.001
Left atrial volume index, mL/m^2 (M±σ)	54.13±13.65	43.14±13.76	0.001
LV end-systolic diameter, mm (M±σ)	43.31±5.08	41.30±4.02	0.061
LV end-diastolic diameter, mm (M±σ)	64.97±6.63	62.19±5.78	0.044
LV end-systolic volume, mL (M±σ)	102.13±38.57	87.96±35.00	0.094
LV end-diastolic volume, mL (M±σ)	237.1±36.2	214.70±60.77	0.035
End-diastolic volume index, mL/m^2 (M±σ)	115.90±17.11	104.9±26.8	0.022
LV ejection fraction, n (%)			
< 40 %	0	2	–
40–49 %	7	9	0.549
≥ 50 %	25	43	0.868
Interventricular septal thickness, mm (M±σ)	11.81±2.61	11.87±2.57	0.92
LV posterior wall thickness, mm (M±σ)	11.69±1.75	11.48±2.05	0.636

vs. 39 (72.2 %) in Group II (OR 3.72; CI [1.01–14.05]; p = 0.043) and 14 (43.7 %) vs. 10 (18.5 %), respectively (OR 3.42; CI [1.29–9.11]; p = 0.012), as well as smoking – 22 (68.8 %) vs. 15 (27.8 %) in Group II (OR 5.72; CI [2.2–14.87]; p < 0.001).

The analysis of preoperative echocardiography parameters revealed significant differences in the mean values of left atrial diameter and it's volume (p = 0.007 and p = 0.001, respectively), left atrial volume index (LAVI) (p = 0.001) during preoperative examination, as well as LV end-diastolic diameter (LV EDD), LV end-diastolic volume (LV EDV) and end-diastolic volume index (EDVI) (p = 0.044, p = 0.035 and p = 0.022, respectively *(Table 3)*.

There were no differences between Groups I and II in the mean values of preoperative laboratory parameters, except for the mean levels of thyroid-stimulating hormone (TSH), which was higher in patients of Group I – 4.96±2.09 mU/L versus 2.30±2.41 mU/L in patients of Group II (p = 0.001), and a lower glomerular filtration rate (GFR) – 97.46±20.25 versus 115.10±33.11 ml/min, respectively (p = 0.008) *(Table 4)*.

Comparing the operative and early postoperative parameters, a higher frequency of median sternotomy was found in patients of Group I – 23 (71.9 %) versus 26 (48.1 %) in Group II (OR 2.75; CI [1.08–7.03]; p = 0.032), longer duration of cardiopulmonary bypass (p < 0.001), aortic cross-clamp time (p = 0.001), duration of surgery and artificial lung ventilation (p = 0.002 and p = 0.006, respectively) *(Table 5)*.

Table 6 shows ROC analysis results for the probable preoperative criteria of POAF prognosis after aortic valve replacement in patients with aortic valve regurgitation.

According to the table 6 and the graphical data of ROC analysis *(Figures 1, 2, 3)*, the development of POAF in patients with aortic valve regurgitation is associated with an increased left atrial diameter > 45.5 mm (sensitivity 56.3 %, specificity 55.6 %), AUROC 0.662 (95 % CI 0.54–0.783; p = 0.013) *(Figure 1A)*, left atrial volume > 92.5 sm^3 (sensitivity 75 %, specificity 62.9 %), AUROC 0.711 (95 % CI 0.6–0.822; p=0.001) *(Figure 1B)* and LAVI > 44.4 mL/m^2 (sensitivity 62.5 %, specificity 59.3 %), AUROC 0.713 (95 % CI 0.603–0.823; p=0.001) *(Figure 1C)*, LV EDD > 63.5 mm (sensitivity 68.8 %, specificity 66.7 %), AUROC 0.63 (95 % CI 0.504–0.756; p=0.045) *(Figure 1D)*, LV EDV > 214.5 mL (sensitivity 68.8 %, specificity 66.7 %), AUROC

Table 4
Differences in preoperative laboratory parameters of patients with and without atrial fibrillation after aortic valve replacement due to aortic valve regurgitation (n = 86)

Indicator	Group I (n = 32)	Group II (n = 54)	p
Leukocytes · 10^9/L (M±σ)	6.43±1.64	7.11±1.82	0.095
Erythrocytes · 10^{12}/L (M±σ)	4.79±0.40	4.99±0.51	0.070
Hemoglobin, g/L (M±σ)	142.40±16.64	149.50±13.89	0.053
Erythrocyte Sedimentation Rate, mm/h (M±σ)	12.23±9.47	7.68±8.92	0.053
Platelets · 10^9/L (M±σ)	197.30±38.87	218.90±71.46	0.131
International normalized ratio (M±σ)	1.01±0.08	0.99±0.06	0.301
Potassium, mmol/L (M±σ)	4.37±0.60	4.43±0.52	0.622
TSH, mU/L (M±σ)	4.96±2.09	2.30±2.41	0.001
Creatinine, mmol/L (M±σ)	90.19±15.61	87.81±14.67	0.481
Cholesterol, mmol/L (M±σ)	4.72±1.19	5.19±1.25	0.201
Blood glucose, mmol/L (M±σ)	5.23±0.58	5.51±0.86	0.141
GFR, mL/min (M±σ)	97.46±20.25	115.10±33.11	0.008

Table 5
Differences in operative and early postoperative parameters of patients with and without atrial fibrillation after aortic valve replacement due to aortic valve regurgitation (n = 86)

Indicator	Group I (n = 32)	Group II (n = 54)	p
Duration of cardiopulmonary bypass, min (M±σ)	77.38±14.66	63.04±13.44	< 0.001
Aortic cross-clamp time, min (M±σ)	56.25±10.44	46.93±12.21	0.001
Surgical access, n (%) mini sternotomy median sternotomy	 9 (28.1 %) 23 (71.9 %)	 28 (51.9 %) 26 (48.1 %)	 – 0.032
Surgery duration, min (M±σ)	166.90±25.96	148.10±24.42	0.002
Duration of artificial lung ventilation, h (M±σ)	4.44±1.48	3.59±1.27	0.006
Length of stay in the intensive care unit, days (M±σ)	2.13±0.49	2.0±0.0	0.064
Hospitalization duration, days (M±σ)	8.38±6.04	9.74±6.79	0.351

0.684 (95 % CI 0.571–0.797; p = 0.004) *(Figure 1E)*, EDVI > 106.2 mL/m^2 (sensitivity 71.7 %, specificity 64.8 %), AUROC 0.668 (95 % CI 0.555–0.782; p = 0.009) *(Figure 1F)*, increased TSH level > 4.75 mU/L (sensitivity 81.3 %, specificity 76.9 %), AUROC 0.757 (95 % CI 0.594–0.921; p = 0.006) *(Figure 2A)* and GFR < 99.8 mL/min (sensitivity 62.5 %, specificity 66.7 %), AUROC 0.316 (95 % CI 0.203–0.429; p = 0.004) *(Figure 2B)*, as well as an increase in the duration of cardiopulmonary bypass > 69.5 min (sensitivity 75 %, specificity 74 %), AUROC 0.774 (95 % CI 0.669–0.88; p < 0.001) *(Figure 3A)*, aortic cross-clamp time duration > 50.5 min (sensitivity 62.5 %, specificity 59.3 %), AUROC 0.72 (95 % CI 0.611–0.829; p = 0.001) *(Figure 3B)*, and the operation duration > 155 min (sensitivity 68.8 %, specificity 66.7 %), AUROC 0.701 (95 % CI 0.587–0.816; p = 0.002) *(Figure 3C)*.

The incidence of POAF in the study among patients with aortic valve regurgitation who underwent aortic valve replacement was 37.2 % (32 patients). This coincides with the contemporary data on the frequency of this complication after surgical correction of valvular pathology. In the study of J. Auer et al. the frequency of POAF was 39.1 % [17]. The frequency of this complication detection in studies is influenced by both the criteria for defining arrhythmia [17] and the diagnostic methods [18]. Multi-day (7 or more days) electrocardiogram (ECG) monitoring allows for more frequent detection of arrhythmias than routine 1-day ECG monitoring or 12-lead ECG [18].

According to our data, preoperative echocardiographic parameters demonstrated typical changes for the clinical picture of aortic regurgitation with an increase of the left heart chambers size. At the same time, the preserved LV contractility is noteworthy (57.64±12.27 % in patients with POAF, 59.64±6.39 % – without POAF). 18

Table 6
Results of ROC analysis for quantitative preoperative parameters as prognostic criteria for postoperative atrial fibrillation after aortic valve replacement (n = 86)

Indicator	AUROC	p	95 % CI	Cut-off point	Sensitivity, %	Specificity, %
Left atrial diameter	0.662	0.013	0.540–0.783	> 45,5 mm	56,3	55,6
Left atrial volume	0.711	0.001	0.600–0.822	> 92.5 sm^3	75	62.9
Left atrial volume index	0.713	0.001	0.603–0.823	> 44.4 ml/m^2	62.5	59.3
LV EDD	0.63	0.045	0.504–0.756	> 63.5 mm	68.8	66.7
LV EDV	0.684	0.004	0.571–0.797	> 214.5 ml	68.8	66.7
EDVI	0.668	0.009	0.555–0.782	> 106.2 ml/m^2	71.7	64.8
TSH	0.757	0.006	0.594–0.921	> 4.75	81.3	76.9
GFR	0.316	0.004	0.203–0.429	< 99.8	62.5	66.7
Duration of cardiopulmonary bypass	0.774	< 0.001	0.669–0.880	> 69.5	75	74
Aortic cross-clamp time	0.72	0.001	0.611–0.829	> 50.5	62.5	59.3
Surgery duration	0.701	0.002	0.587–0.816	> 155	68.8	66.7

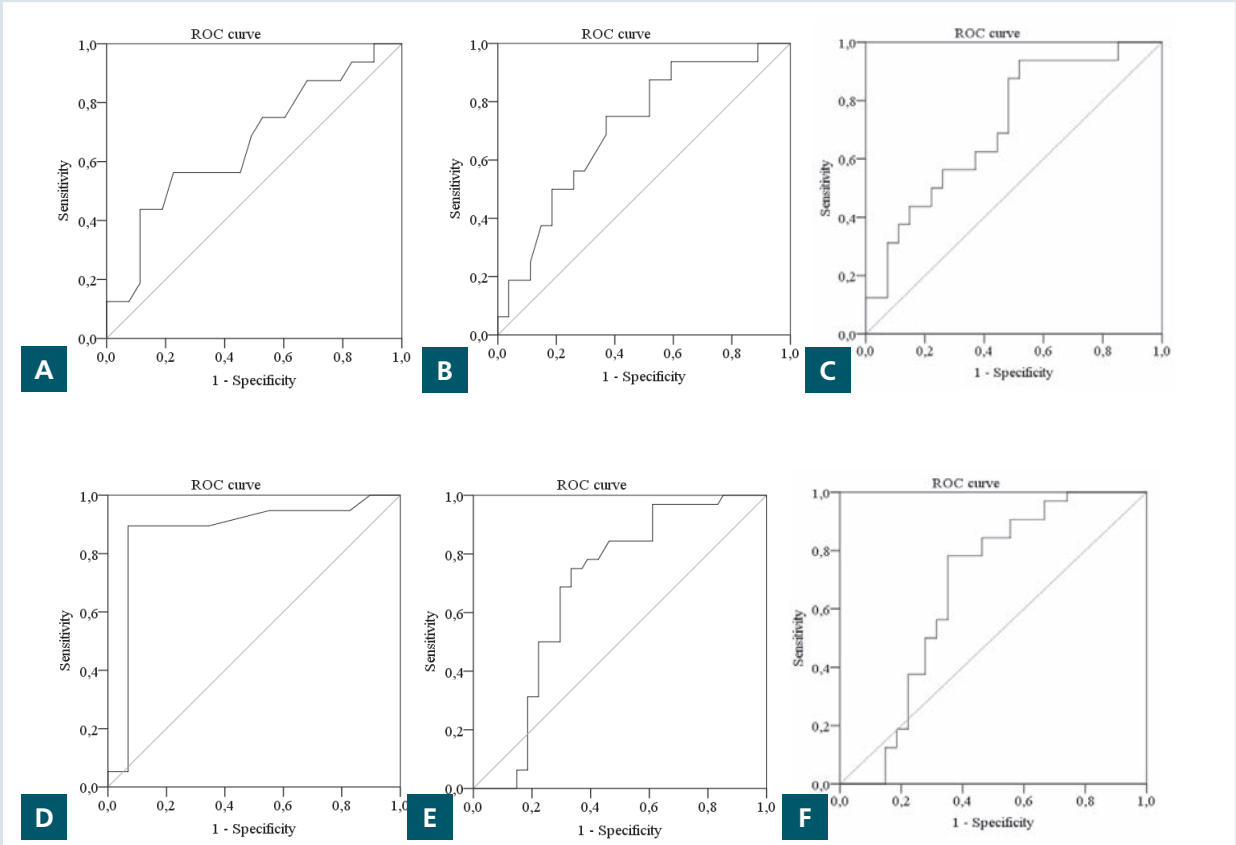

Figure 1. **ROC curves characterizing the connection between the probability of atrial fibrillation development after aortic valve replacement in patients with aortic valve regurgitation and preoperative echocardiographic parameters: left atrial diameter (A), left atrial volume (B), LAVI (C), LV ejection fraction (D), LV EDD (E), and LV EDV (F)**

out of 86 patients had an ejection fraction below normal (30–49 %), which was 15.5 %. According to the 2024 ACC/AHA Clinical Performance and Quality Measures for Adults With Valvular and Structural Heart Disease, preoperative echocardiographic findings are crucial for determining the indications for surgical treatment of asymptomatic patients with aortic heart disease [8].

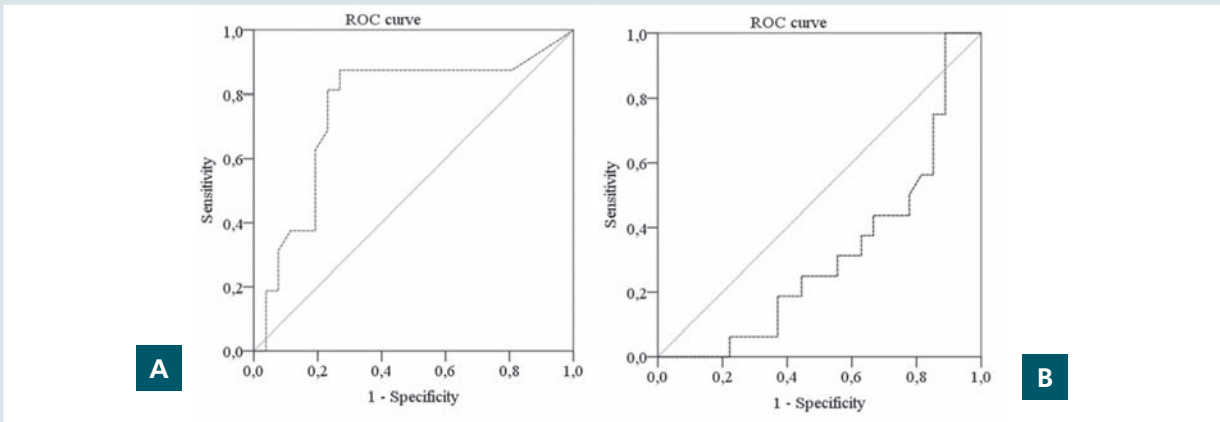

Figure 2. **ROC curves characterizing the connection between the probability of atrial fibrillation development after aortic valve replacement in patients with aortic valve regurgitation and preoperative laboratory parameters: TSH (A), GFR (B)**

Group I significantly differed from Group II regarding age of the patients, which might be explained by the appearance of fibrosis in the atrial tissue causing changes in the electrophysiological and anatomical parameters of the left atrium in the elderly [19].

In terms of clinical indicators, Group I was statistically significantly different from Group II in the frequency of hypertension, chronic kidney disease, smoking, as well as an increase in the left atrial diameter and it's volume, LV EDD and LV EDV. The latter also correlates with global data on the increasing risk of POAF development with increasing heart chambers [13, 20].

Analysis of preoperative laboratory parameters revealed a significant relation between the frequency of POAF development and the level of TSH and GFR.

As in other studies [21, 22], we found a higher frequency of median sternotomy among patients with POAF (OR 2.75; CI [1.08–7.03]; p = 0.032). These patients also had a longer duration of cardiopulmonary bypass (p < 0.001), aortic cross-clamp time (p = 0.001), duration of surgery, and artificial lung ventilation (p = 0.002 and p = 0.006, respectively).

The operations using cardiopulmonary bypass are accompanied by the development of a systemic inflammatory process. This may disrupt conduction in the atrium which, in turn, plays an important role in the POAF development. According to our data, the duration of cardiopulmonary bypass (AUROC 0.774; 95 % CI 0.669–0.880) and aortic cross-clamp time duration (AUROC 0.72; 95 % CI 0.611–0.829) at cut-off > 69.5 min and > 50.5 min, respectively, as well as the surgery duration (AUROC 0.701; 95 % CI

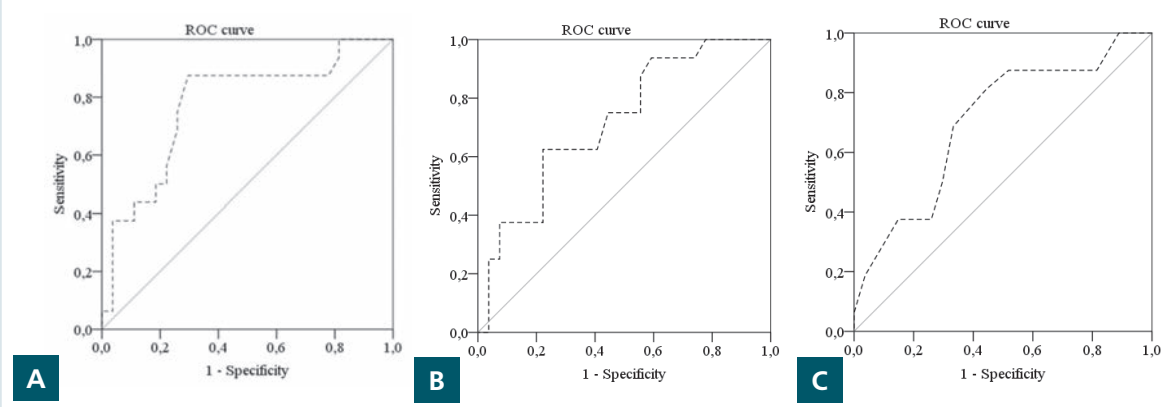

Figure 3. **ROC curves characterizing the relation between the probability of atrial fibrillation development after aortic valve replacement in patients with aortic valve regurgitation and the characteristics of the surgical intervention: duration of cardiopulmonary bypass (A), aortic cross-clamp time duration (B), surgery duration (C)**

0.587–0.816) > 155 min demonstrates a significant association with the POAF development.

Aortic regurgitation is fundamentally different in its pathophysiology and intracardiac hemodynamics from aortic stenosis. We believe that the prognostic factors we have identified for the development of POAF will allow us to develop strategies for preventing this complication, improve the results of surgical treatment and postoperative recovery of such patients after heart valve replacement.

Conclusions

The incidence of POAF in patients with aortic valve regurgitation after aortic valve replacement was 37.2 %.

Reliable predictors of the POAF development in patients with aortic valve regurgitation who underwent aortic valve replacement are older mean age of patients, presence of hypertension, smoking, increased left atrial diameter > 45.5 mm, it's volume > 92.5 cm^3, LAVI > 44.4 mL/m^2, LV EDD > 63.5 mm, LV EDV > 214.5 mL, EDVI > 106.2 mL/m^2, TSH level > 4.75 mU/L, and GFR < 99.8 mL/min.

Perioperative parameters associated with the development of atrial fibrillation after valve replacement in patients with aortic valve regurgitation include: use of median sternotomy (OR 2.75; CI [1.08–7.03]), duration of cardiopulmonary bypass > 69.5 min, aortic cross-clamp time duration > 50.5 min, and operation duration > 155 min.

Доступність даних:	Data availability:
Дані можуть бути надані за обґрунтованим запитом.	*Data can be provided upon reasonable request.*
Джерела фінансування:	Sources of funding:
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Конфлікт інтересів:	Conflict of interest:
Конфлікту інтересів немає.	*There is no conflict of interest.*
Участь авторів:	Authors' participation:
Ідея та дизайн дослідження – Б.Т.; лікування хворих – Б.Т., Ф.Х.Г.; збір і обробка матеріалів, написання тексту – Ф.Х.Г.	*Study concept and design – B.T.; patient treatment – B.T., F.H.G.; collection and processing of materials, writing text – F.H.G.*
Етичне схвалення:	Ethical approval:
Протокол дослідження був затверджений комісією з біоетики ДНП «Інститут серця МОЗ України» (22.08.2023 р.).	*The study protocol was approved by the Local Ethics Committee of the Heart Institute (22.08.2023).*
Інформована згода:	Informed consent:
Дослідження проводилося відповідно до принципів Гельсінської декларації. Від усіх пацієнтів отримано інформовану згоду на участь у дослідженні.	*The study was conducted in accordance with the principles of the Helsinki Declaration. Informed consent to participate in the study was obtained from all patients.*
Подяка:	Gratitude:
Автори дякують пацієнтам-учасникам дослідження за згоду на використання інформації і участь у дослідженні.	*The authors thank the patients participating in the study for their consent to use the information and participate in the study.*

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Післяопераційна фібриляція передсердь у пацієнтів із недостатністю аортального клапана після його протезування

Мета роботи – визначити частоту розвитку післяопераційної фібриляції передсердь (ПОФП) і фактори ризику її виникнення в пацієнтів із недостатністю аортального клапана, яким було виконано його протезування.

Матеріали і методи. У дослідження було залучено 86 хворих із недостатністю аортального клапана, яким було проведено протезування аортального клапана. Пацієнти були розділені на дві групи: I група – 32 особи, в яких розвинулася ПОФП, II група – 54 хворих без порушення ритму серця. Проведено порівняння демографічних, доопераційних загальноклінічних, інструментальних та електрофізіологічних показників, а також інтраопераційних і ранніх післяопераційних параметрів у цих групах пацієнтів.

Результати. У пацієнтів у групі ПОФП статистично значуще частіше реєстрували гіпертонічну хворобу, хронічну хворобу нирок, куріння, використання серединної стернотомії. За допомогою ROC-аналізу встановлено, що предикторами ризику ПОФП є діаметр лівого передсердя, його об'єм, індекс об'єму лівого передсердя, кінцевий діастолічний розмір (КДР) лівого шлуночка (ЛШ), кінцевий діастолічний об'єм (КДО), кінцевий діастолічний індекс (КДІ), рівень тиреотропного гормону (ТТГ) у крові та швидкість клубочкової фільтрації (ШКФ), тривалість перебування на штучному кровообігу, перетискання аорти та операції.

Висновки. Частота розвитку ПОФП у пацієнтів із недостатністю аортального клапана, яким було виконано його протезування, становила 37,2 %. Значущими факторами ризику ПОФП є: наявність гіпертонічної хвороби, тютюнопаління, діаметр лівого передсердя > 45,5 мм, його об'єм > 92,5 см^3, індекс об'єму лівого передсердя > 44,4 мл/м^2, КДР ЛШ > 63,5 мм, КДО ЛШ > 214,5 мл, КДІ > 106,2 мл/м^2, рівень ТТГ крові > 4,75 мОд/л та ШКФ < 99,8 мл/хв, тривалість штучного кровообігу > 69,5 хв, перетискання аорти > 50,5 хв, тривалість операції > 155 хв, використання серединної стернотомії.

Ключові слова: недостатність аортального клапана, протезування аортального клапана, післяопераційна фібриляція передсердь, предиктори.