Comparison of postoperative complications following cardiac surgery with or without added surgical ablation in patients with coronary and/or valvular heart disease plus atrial fibrillation

Marta Czapka, Łukasz Moskal, Adam Rowiński, Katarzyna Baczyńska, Ireneusz Szwedo, Wojciech Kustrzycki, Romuald Cichoń

Medinet Heart Center, Wrocław, Poland

Correspondence to:
Marta Czapka, MD,
Medinet Heart Center,
Kamieńskiego 73a,
51–124 Wrocław, Poland,
phone: +48 531 736 432,
e-mail:
marta.m.czapka@gmail.com

DOI: 10.33963/KP.a2022.0083

Received:
October 7, 2021

Accepted:
March 25, 2022

Early publication date:
March 28, 2022

INTRODUCTION

Atrial fibrillation (AF) is the most common supraventricular arrhythmia associated with an increased risk of death, stroke, heart failure, and thromboembolic events, which results in an increased number of hospitalizations [1–4]. Moreover, the prevalence of AF increases with age [4, 5]. According to epidemiological data, 1%–2% of the population suffers from this arrhythmia [1]. Patients with atrial fibrillation complain of a significant reduction in the quality of life in comparison to healthy people of the same age and those with similar cardiovascular diseases [6]. Effective treatment of presented arrhythmia, like surgical ablation, appears to be a priority given the impact of atrial fibrillation on the quality of life and life expectancy. Numerous studies show that patients with atrial fibrillation who underwent ablation have a comparable survival rate to those without AF [7]. It has also been demonstrated that the 1-year survival rate after coronary artery bypass grafting (CABG) is greater in patients after additional ablation compared to those without the procedure [8]. Therefore, a combination of elective cardiac surgery and ablation seems to be the appropriate treatment choice for patients with atrial fibrillation. Nevertheless, there is still a great number of patients who do not receive optimal surgical treatment [5, 8].

We assessed the postoperative complications rate in patients who underwent a combined procedure (primary and concomitant surgical ablation of AF) in comparison to patients who received only the primary procedure.

METHODS

We retrospectively reviewed all patients hospitalized in the Medinet Heart Center between the years 2016 and 2018 who met inclusion criteria (presence of paroxysmal AF or different than paroxysmal AF) and exclusion criteria (life-saving surgery, incomplete medical documentation). For baseline characteristics of our patients, the information on sex, age, type of AF (paroxysmal AF and other than paroxysmal AF), presence of arterial hypertension, history of stroke, creatinine level in the blood, and the level of EuroSCORE II was acquired.

Performed cardiac interventions were divided into the CABG, valve surgery, and combined groups.

Data on creatinine levels in the first 3 days after surgery, dialysis, stroke, intestinal ischemia, multiorgan failure (MOF), reoperation because of bleeding, postoperative wound infection, exacerbation of renal failure, pneumonia, and death constituted postoperative complications.

Continuous variables were expressed as mean standard deviation (SD) for normal distributions, while others were presented as median (interquartile range [IQR]). Categorical data are given as frequency (percentages). Normality was tested using the Shapiro-Wilk test.

The Student t-test was used for comparisons between the groups of parametric

Table 1. Comparison of the participants

Parameters		Group A (with ablation) (n = 51)	Group B (without ablation) (n = 62)	*P*-value
Baseline characteristics				
Age, years, mean (SD)		65.7 (8.4)	69.4 (8.6)	0.03
Female gender, n (%)		14 (27.5)	21 (33.9)	0.18
AF, n (%)	Paroxysmal	20 (39.2)	17 (27.4)	0.18
	Other	31 (60.8)	45 (72.6)	
Atrial hypertension, n (%)		30 (58.8)	35 (56.5)	0.80
Stroke, n (%)		3 (5.9)	3 (4.8)	1.00
Creatinine level before surgery, mg/dl, median (IQR)		1.06 (0.87–1.22)	1.08 (0.88–1.29)	0.70
EuroSCORE II, median (IQR)		0.02 (0.01–0.03)	0.02 (0.01–0.04)	0.85
Postoperative complications				
Dialysis, n (%)		2 (3.9)	2 (3.2)	1.00
Stroke, n (%)		1 (2.0)	1 (1.6)	1.00
Intestinal ischemia, n (%)		0 (0)	0 (0.0)	1.00
MOF, n (%)		2 (3.9)	1 (1.6)	0.59
Reoperation due to bleeding, n (%)		10 (19.6)	10 (16.1)	0.63
Postoperative wound infection, n (%)		1 (2.0)	2 (3.2)	1.00
Exacerbation of renal failure, n (%)		5 (9.8)	4 (6.5)	0.73
Pneumonia, n (%)		1 (2.0)	0 (0.0)	0.45
Death, n (%)		3 (5.9)	3 (4.8)	1.00
Creatinine level — first 3 days after surgery, mg/dl, median (IQR)		1.19 (0.83–1.65)	1.46 (1.05– 1.97)	0.15

Abbreviations: AF, atrial fibrillation; MOF, multiorgan failure

variables. For the non-parametric hypothesis, the χ^2 test or the exact Fischer test was applied. The Mann-Whitney U test was used for skewed variables. All statistical tests were evaluated at a significance level of 0.05. The PQStat 1.6.8 software was used during the statistical analysis.

RESULTS AND DISCUSSION

The study group consisted of 113 patients hospitalized in the Medinet Heart Center. They were divided into two groups: one without surgical ablation (group A, n = 51) and one with patients who had combined cardiac surgery and surgical ablation (group B, n = 62). To check the homogeneity of both groups, preoperative demographic risk factors such as gender and age were analyzed. Both groups were comparable with regard to female sex (group A, n = 14 vs. group B, n = 21; $P = 0.18$), but differed in a reference to age (group A, n = 65.7 [8.4] years vs. group B, n = 69.4 [8.6] years; $P = 0.03$).

The prevalence of paroxysmal AF and non-paroxysmal AF (persistent + permanent) was comparable in both groups ($P = 0.18$).

In terms of comorbidities: arterial hypertension (group A, n = 30 vs. group B, n = 35; $P = 0.80$), history of stroke (group A, n = 3 vs. group B, n = 3; $P = 1.00$), and creatinine levels (group A, n = 1.1 mg/dl vs. group B, n = 1.2 mg/dl; $P = 0.70$; 1.06 [0.87–1.22] mg/dl to 1.08 [0.88–1.29] mg/dl (median [IQR]) in the blood, both groups were comparable. No statistically significant difference was observed regarding EuroSCORE II between both groups (Table 1).

Patients included in our research have undergone various procedures, including CABG (group A, n = 3, group B, n = 15), valve surgery (group A, n = 8, group B, n = 10), and a combined procedure (group A, n = 40, group B, n = 37).

Depending on the scope of ablation, the following types were performed: isolation of right and left pulmonary veins, extended ablation (including isolation of pulmonary veins and other additional ablation lines, usually [additionally] isolation of the left atrium posterior wall — box lesion, right atrial ablation, and others), and Maze IV (complete set of ablation lines according to the Maze IV scheme).

As a result, we compared the occurrence of stroke, intestinal ischemia, MOF, exacerbation of kidney failure, pneumonia, death, the incidence of surgical wound infection, and necessity of reoperation due to hemorrhage after surgery. We also compared creatinine levels in the blood on three consecutive days after the operation (Table 1).

Regarding the usage of catecholamines and steroids intraoperatively, the two groups did not differ significantly. No patient required implantation of a permanent pacemaker after surgery. All patients received the same anticoagulant treatment consisting of low-molecular-weight heparin at the beginning and vitamin K antagonists (VKA) afterward.

Effective ablation, regardless of the method, frees most patients from arrhythmia episodes and improves their quality of life [6, 7, 9]. The literature compares the survival of patients undergoing successful ablation to those without atrial fibrillation in history [7]. This is especially important for patients referred to cardiac surgery departments, as a great number of them are diagnosed with atrial fibrillation. Consequently, management of those patients requires close cooperation between cardiac surgeons and electrophysiologists [10].

Our findings in terms of the risk of death and complications are consistent with other studies on this topic [8, 11, 12]. In addition, mortality after cardiac surgery due to

any reason is lower in those patients who have undergone additional ablation [8]. Restoring the sinus rhythm gives patients a chance for a better and longer life.

Even though the efficiency of concomitant surgical ablation and cardiac surgery has been shown, it is still underused. The length of aortic cross-clamp and overall procedure constitute the main reasons among cardiac surgeons to refrain from surgical ablation [13].

Our study has shown that adding ablation to elective cardiac surgery does not increase the risk of death or the incidence of other complications. Prolonging the time of the procedure, increasing the time of cardiac arrest did not affect the mortality or number of complications.

We strongly recommend performing concomitant surgical ablation during cardiac surgery since this is a safe procedure and is of great importance in terms of patients' prognosis for substantially improved quality of life.

Article information

Conflict of interest: None declared.

Funding: None.

REFERENCES

1. Chen S, Schmidt B, Bordignon S, et al. Atrial fibrillation ablation using cryoballoon technology: Recent advances and practical techniques. J Cardiovasc Electrophysiol. 2018; 29(6): 932–943, doi: 10.1111/jce.13607, indexed in Pubmed: 29663562.
2. Kirchhof P, Benussi S, Kotecha D, et al. 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. Europace. 2016; 18(11): 1609–1678, doi: 10.1093/europace/euw295, indexed in Pubmed: 27567465.
3. Richter S, Di Biase L, Hindricks G. Atrial fibrillation ablation in heart failure. Eur Heart J. 2019; 40(8): 663–671, doi: 10.1093/eurheartj/ehy778, indexed in Pubmed: 30561633.
4. Kirchhof P. The future of atrial fibrillation management: integrated care and stratified therapy. Lancet. 2017; 390(10105): 1873–1887, doi: 10.1016/S0140-6736(17)31072-3, indexed in Pubmed: 28460828.
5. Budera P, Straka Z, Osmančík P, et al. Comparison of cardiac surgery with left atrial surgical ablation vs. cardiac surgery without atrial ablation in patients with coronary and/or valvular heart disease plus atrial fibrillation: final results of the PRAGUE-12 randomized multicentre study. Eur Heart J. 2012; 33(21): 2644–2652, doi: 10.1093/eurheartj/ehs290, indexed in Pubmed: 22930458.
6. Mark DB, Anstrom KJ, Sheng S, et al. Effect of Catheter Ablation vs Medical Therapy on Quality of Life Among Patients With Atrial Fibrillation: The CABANA Randomized Clinical Trial. JAMA. 2019; 321(13): 1275–1285, doi: 10.1001/jama.2019.0692, indexed in Pubmed: 30874716.
7. Lee R, McCarthy PM, Wang EC, et al. Midterm survival in patients treated for atrial fibrillation: a propensity-matched comparison to patients without a history of atrial fibrillation. J Thorac Cardiovasc Surg. 2012; 143(6): 1341–51; discussion 1350, doi: 10.1016/j.jtcvs.2012.02.006, indexed in Pubmed: 22465031.
8. Rankin J, Lerner D, Braid-Forbes M, et al. One-year mortality and costs associated with surgical ablation for atrial fibrillation concomitant to coronary artery bypass grafting†. J Thorac Cardiovasc Surg. 2017; 52(3): 471–477, doi: 10.1093/ejcts/ezx126, indexed in Pubmed: 28472412.
9. Zheng ZH, Fan J, Ji CC, et al. Long-Term outcomes and improvements in quality of life in patients with atrial fibrillation treated with catheter ablation vs. Antiarrhythmic drugs. Am J Cardiovasc Drugs. 2021; 21(3): 299–320, doi: 10.1007/s40256-020-00435-9, indexed in Pubmed: 33000397.
10. Bartoszcze A, Litwinowicz R, Karkowski G, et al. Electro Heart Team: integrating new approaches to atrial fibrillation management. Kardiol Pol. 2021; 79(1): 101–102, doi: 10.33963/KP.15772, indexed in Pubmed: 33494579.
11. Nashef SAM, Fynn S, Abu-Omar Y, et al. Amaze: a randomized controlled trial of adjunct surgery for atrial fibrillation. Eur J Cardiothorac Surg. 2018; 54(4): 729–737, doi: 10.1093/ejcts/ezy165, indexed in Pubmed: 29672731.
12. Gu W, Guo H, Lu C, et al. Surgical ablation for persistent atrial fibrillation in concomitant cardiac surgery: mid-long-term result. Eur J Cardiothorac Surg. 2017; 52(5): 888–894, doi: 10.1093/ejcts/ezx179, indexed in Pubmed: 28605469.
13. Gillinov M, Moskowitz AJ, Argenziano M, et al. Surgical ablation of atrial fibrillation during mitral-valve surgery. N Engl J Med. 2015; 372(15): 1399–1409, doi: 10.1056/NEJMoa1500528, indexed in Pubmed: 25853744.