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Factors determining elective cardioversion preceded with transesophageal echocardiography: two cardiology centres’ experiences

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Short title: Elective cardioversion without prior transesophageal echocardiography.

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Abstract

Introduction: Although guidelines allow cardioversion after adequate non-vitamin K antagonist oral anticoagulant (NOAC) treatment without prior transesophageal echocardiography (TEE), the majority of patients still undergo this examination.

Objectives: The aim of this study was to assess the factors determining the decision to perform TEE in patients with atrial fibrillation (AF) who are qualified for elective cardioversion.

Patients and methods: In this study, we evaluated the medical data of consecutive patients with AF who were admitted for cardioversion after being previously treated with NOACs.

Results: Of a total of 668 patients included in the study, 362 (54%) underwent TEE before cardioversion. In a univariable analysis, paroxysmal AF, hypertension, coronary disease, thromboembolic event, a history of percutaneous coronary intervention, a history of bleeding, left ventricular (LV) ejection fraction, LV end-diastolic diameter, a reduced dose of NOACs, hemoglobin, impaired renal filtration, and a high CHA2DS2VASc score were significant predictors of the decision to perform TEE. In the multivariable logistic regression analysis, a history of coronary disease, bleeding, and stroke/transient ischemic attack (TIA)/thromboembolism remained independent predictors of a patient qualifying for TEE (odds ratio [OR] 3.92; $P<0.001$; OR 7.92; $P<0.001$ and OR 2.36; $P=0.02$, respectively). In contrast, paroxysmal AF (OR 0.31; $P=0.02$) and hypertension (OR 0.28; $P<0.001$) were indicators to avoid TEE.

Conclusions: TEE before cardioversion was more frequent in patients with a history of coronary disease, bleeding, or thromboembolic event. Patients with paroxysmal AF and hypertension more often received cardioversion without prior TEE.
**Key words:** atrial fibrillation, cardioversion, novel oral anticoagulants, transesophageal echocardiography

**What’s new?**
We aimed to identify the patient features that are important to clinicians in qualifying patients for transesophageal echocardiography (TEE) before elective cardioversion despite adequate anticoagulant therapy. In patients with a diagnosis of coronary artery disease or a history of bleeding or thromboembolic event, TEE was performed more frequently. Patients with paroxysmal atrial fibrillation and hypertension more often received cardioversion without prior TEE. Factors that have been proven to predispose patients to left atrial appendage thrombus formation (such as heart failure with left ventricular ejection fraction < 50% and kidney disease) still influence clinical decisions about prior TEE, even in hypothetically effectively treated subjects.

**Introduction**
Atrial fibrillation (AF) increases the risk of thromboembolic complications, contributing to thrombus formation especially in the left atrial appendage (LAA). Cardiogenic stroke accounts for approximately 15–20% of all cerebral ischemia cases [1]. One of the main purposes of using oral anticoagulation therapy (OAT) is to reduce the risk of embolic complications when restoring sinus rhythm by electrical/pharmacological cardioversion. Data from clinical trials and the 2016 ESC guidelines for AF treatment indicate that cardioversion without transesophageal echocardiography (TEE) is safe provided patients take non-vitamin K antagonist oral anticoagulants (NOACs) for at least three weeks before cardioversion [3,4,5,6]. However, the practice of many cardiology centers shows that TEE examination before elective cardioversion is performed much more often than is recommended. The aim of the study was to identify factors determining the decision to perform TEE in patients with AF who are qualified for elective cardioversion.
Patients and methods

Study design and patients

This was an observational study based on the medical data of consecutive patients with AF who were admitted to two Polish cardiology departments (Military Institute of Medicine in Warsaw and Swietokrzyskie Cardiology Centre in Kielce) between January 2018 and April 2019 for elective cardioversion after being previously treated with NOACs with confirmed good treatment compliance. Adequate anticoagulation was defined as regularly taking NOACs according to recommendations. Every patient had to sign the document confirming adequate NOACs intake and before signing it he was informed about the side effects of omitting even 1 dose of NOACs. Decisions regarding the performance of a TEE examination before cardioversion were made individually for each patient according to the rules adopted in each cardiology center. We chose two high-reference cardiology centers with the possibility of performing TEE for each patient with AF, to analyze what factors influence withdrawal from this examination. That way, we wanted to avoid a situation in which the decisive factor in performing cardioversion without TEE was the lack of access to it.

The collected data included baseline demographic characteristics, the results of a clinical evaluation, laboratory tests, echocardiography, and treatment strategy at the time of TEE and were obtained both directly from patients and from each hospital’s medical database. The clinical evaluation focused on age, sex, co-morbidities, type of AF and type of NOAC used. A CHA₂DS₂-VASc score was calculated for each patient accordingly to the current recommendations [2]. Paroxysmal AF was defined as AF lasting ≤ 7 days and > 48 hour [2]. Patients were divided into two groups based on AF type: paroxysmal and non-paroxysmal AF, based on a careful and thorough analysis of all the available medical documentation, including current and previous medical records, electrocardiograms and, in some patients, Holter monitoring (if available). Laboratory tests included the evaluation of renal function
(estimated glomerular filtration rate (eGFR)) and red blood cell disorders (hemoglobin).
eGFR was calculated from the Modification of Diet in Renal Disease formula [7]. Impaired renal filtration was defined as eGFR < 60ml/min/1.73m² [8]. Exclusion criteria were as follows: valvular AF (significant mitral stenosis or prosthetic valve), patients undergoing renal replacement therapy, eGFR < 15ml/min/1.73m², and inadequate anticoagulation therapy.

**Transthoracic echocardiography**
The analyzed echocardiographic examinations were performed at one of the two cardiology centers within 12 months of the patient’s admission for cardioversion. The analysis included the left atrial (LA) anteroposterior diameter (LAd), the left ventricular (LV) end-diastolic diameter (LVDd), and the left ventricular ejection fraction (LVEF).

**Transesophageal echocardiography**
The transesophageal echocardiography was usually performed a few hours before the cardioversion (not more than 24 hours) in a grade C accredited (according to the Section of Echocardiography of the Polish Cardiac Society) echocardiography laboratory. Ultrasound systems (General Electric Vivid E95, Milwaukee, Wisconsin and Philips EPIQ 7, Massachusetts, United States) were used. During the TEE, both atrials and LAA were scanned in detail with a continuous sweep of the echocardiography probe from 0 to 180 degrees. Only patients without left atrial appendage thrombus (LAAT) received cardioversion.

**Statistical analysis**
Statistical calculations were performed with Statistica v. 12 (Statsoft Inc., Tulsa, Oklahoma, United States). The normality of continuous variable distribution was tested using the Shapiro-Wilk test. Since none of the parameters had a normal distribution, continuous variables were presented as medians (Interquartile Range, IQR: 1st–3rd quartile). Categorical variables were presented as frequencies. Comparisons of the groups were made using the
Mann–Whitney U test for continuous variables and a chi-square test with Yates correction for categorical variables. Univariable logistic regression was performed using numerous variables, while in the multivariable logistic regression analysis, only the parameters found significant in the univariable analysis at the level of $P = 0.05$ were included. If the factors were linked (e.g., presence of coronary artery disease, previous myocardial infarction, previous percutaneous coronary intervention, previous coronary artery bypass graft), only the major parameter was included in the multivariable logistic regression analysis. Collinearity was checked of all quantitative parameters included in multivariable logistic regression analysis. For all calculations, two-tailed tests were used, and the level of significance was set at 0.05.

**Ethical consideration**

The studies were conducted according to Good Clinical Practice guidelines and the Declaration of Helsinki. The study protocol was approved by the local ethics committee. The Ethics Committee waived the requirement of obtaining informed consent from the patients to participate in the study.

**Results**

A total of 668 patients (64% men) were included in the study, and 362 (54%) patients underwent TEE before cardioversion (the TEE(+) group). The remaining patients had cardioversion without prior TEE (the TEE(-) group).

Subjects in the TEE(+) group, compared to the TEE(-) group, had a higher CHA$_2$DS$_2$VASc score ($P < 0.001$) and a higher prevalence of non-paroxysmal AF ($P < 0.001$), impaired renal filtration ($P < 0.001$), coronary artery disease ($P < 0.001$), and previous bleeding ($P < 0.001$).

The treatment of patients taking different types of NOACs in both the TEE(+) and the TEE(-) groups was comparable except for patients taking apixaban. However, the patients in the TEE(+) group more often received reduced doses of NOACs ($P = 0.045$). Patients with a history of bleeding had similar rates of reduced doses of NOACs compared with the rest of
the patients (7.8% vs. 9.2%, \( P = 0.93 \)) but they more often had impaired renal filtration (49% vs 28%, \( P = 0.003 \)). Patients in the TEE (+) group compared to the TEE(-) group presented with a higher anteroposterior LA diameter (\( P = 0.03 \)) and end-diastolic LV diameter (\( P = 0.001 \)). LVEF < 50% was also more frequent in the TEE(+) group (\( P = 0.03 \)). Detailed results are shown in Table 1.

In the univariable logistic regression analysis, numerous predictors of TEE before cardioversion were found (Table 2). However, in the multivariable logistic regression analysis, only a history of coronary disease, bleeding, and stroke/transient ischemic attack (TIA)/thromboembolism remained independent predictors of a patient qualifying for TEE (odds ratio [OR] 3.92; 95% CI: 2.36–6.51; \( P < 0.001 \); OR 7.92; 95% CI: 2.76–22.69; \( P < 0.001 \) and OR 2.36; 95% CI: 1.12–4.97; \( P = 0.02 \), respectively) (Table 3). In contrast, paroxysmal AF and hypertension (OR 0.31; 95% CI: 0.12–0.84; \( P = 0.02 \) and OR 0.28; 95% CI: 0.15–0.54; \( P < 0.001 \), respectively) were shown to be reasons to avoid TEE before cardioversion.

Within the TEE (+) group, LAAT was observed in 26 (7.18%) patients. None of the patients had a thromboembolic event within the first month of follow-up.

**Discussion**

In this observational study, we investigated the premises for the clinical decision to perform TEE in AF patients treated with NOACs who qualified to receive elective cardioversion at two cardiology centers. Current guidelines recommend TEE when it is not possible to confirm adequate anticoagulation treatment. Both the European and the American Society of Cardiology state that TEE is not necessary in most patients treated regularly with NOACs for least three weeks before cardioversion [2,9]. However, it seems that in many cardiology centers, TEE is still performed more often than would appear necessary from the
recommendations. In our study group, 362 (54%) of AF patients underwent TEE before cardioversion despite adequate anticoagulation therapy.

One could assume intuitively that if the CHA\textsubscript{2}DS\textsubscript{2}VASc scale is the gold standard in assessing thromboembolic events, we should perform TEE in AF patients with a high CHA\textsubscript{2}DS\textsubscript{2}VASc score regardless of prior anticoagulation treatment. However, some studies [10] have revealed no significant correlations between CHA\textsubscript{2}DS\textsubscript{2}VASc score and the occurrence of LAAT and/or sludge. In a recent polish study, Kosmalska et al. [11] showed that there was no correlation between CHA\textsubscript{2}DS\textsubscript{2}VASc score and LAAT/sludge in patients with AF when patients with a CHA\textsubscript{2}DS\textsubscript{2}VASc score \( \leq 1 \) were excluded from the analysis. In this study, the authors didn’t find any thrombus/sludge in AF patients with a CHA\textsubscript{2}DS\textsubscript{2}VASc score \( \leq 1 \). The authors recommended performing TEE prior to cardioversion in most AF patients regardless of adequate anticoagulation treatment. These findings were confirmed in another study that suggests there is a clinically relevant risk of stroke even in patients with a low CHA\textsubscript{2}DS\textsubscript{2}VASc score [12]. In this study, Chao et al., during follow-up (5.2 \( \pm \) 4.3 years), reported ischemic stroke in 1,858 patients out of 12,935 male AF patients (14.4%) with a CHA\textsubscript{2}DS\textsubscript{2}VASc score of 1 point.

Our study found a higher incidence of non-paroxysmal AF and impaired renal filtration in patients who underwent TEE before cardioversion. A greater frequency of LAAT in patients with kidney disease and in the presence of non-paroxysmal AF has been reported by several earlier studies [13,14]. Kaplon-Cieślicka et al. [13] proved that a new CHA\textsubscript{2}DS\textsubscript{2}VASc-RAF score was better than CHADS and CHA\textsubscript{2}DS\textsubscript{2}VASc scales to predict LAAT thrombus in patients with AF (where R stands for renal dysfunction and AF for non-paroxysmal AF).

Following the new scale provided by these authors, we also calculated the CHA\textsubscript{2}DS\textsubscript{2}VASc-RAF score for our patients and it appeared that its value for patients with prior TEE was higher compared to TEE(-) group (7.66 vs 6.63). Moreover, the mean CHA\textsubscript{2}DS\textsubscript{2}VASc-RAF
score for patients with LAAT was clearly higher than CHA₂DS₂-VASc score: 10.4 and 3.5, respectively. These findings justify the everyday practice of considering parameters in deciding whether to perform TEE before cardioversion.

Another interesting issue is the use of reduced NOAC doses. Among patients in our study, those who underwent TEE more often received reduced doses of NOACs. Unfortunately, we don’t have the exact data to show whether these lower doses were appropriate to guidelines or justified by other reasons. Our group could have potentially included patients taking an inappropriately low dose of NOACs. Surprisingly, a history of bleeding didn’t influence the decision to prescribe a reduced dose of NOACs. Overall, approximately 9.1% of our patients had a reduced dose of NOACs. In the group without a history of bleeding, 9.2% had a reduced dose of NOACs, compared to 7.8% in the group with a history of bleeding. The difference was not statistically significant ($P = 0.93$). The history of bleeding turned out to be the main determinant of TEE performance. In an additional analysis, we showed that patients with a history of bleeding more often had impaired renal filtration. Perhaps in the light of the aforementioned study [13], this may explain the role of bleeding history as an independent determinant of prior TEE. Despite this bias, taking low-dose NOACs increased the likelihood that TEE would be conducted prior to cardioversion. Is this anxiety on the part of doctors regarding the limited effectiveness of NOACs reasonable? Jelonek et al. [15] showed, that although standard doses of NOACs are prescribed to most patients, the frequency of administration of inadequately reduced doses of NOACs is also high. Recent studies showed that inappropriately reduced NOAC doses may increase thromboembolic risk [16,17,18]. Cho et al. [18] reported in their study that, in particular, the use of a lower dose of apixaban showed a marked reduction in efficacy over warfarin. On the other hand, Wang et al. reported [19] that the effects of reduced-dose NOACs (in patients eligible for reduced NOACs) compared with those of warfarin on stroke or systemic embolism and, on major bleeding,
were comparable with the effects of full-dose NOACs relative to warfarin. Similarly, a large meta-analysis (including 14 observational cohorts) comparing the efficacy and safety of reduced-dose NOACs vs. warfarin in AF patients revealed that the use of reduced NOACs was associated with a decreased risk of stroke or systemic embolism and ischemic stroke as well as bleeding complications [20].

As expected, the independent predictors of whether a TEE would be conducted before cardioversion proved to be co-morbidities such as stroke, TIA, thromboembolism, coronary disease, and a history of bleeding. Most of these are components of the CHA2DS2-VASc scale; therefore, it is not surprising that they influenced doctors’ decisions to perform an additional test to increase patients’ safety. In our present study, LVEF < 50% also affected the decision to perform TEE before cardioversion, but it did not prove to be an independent factor in multivariable regression analysis. Many authors have demonstrated a significantly higher incidence of LAAT or stroke in patients with reduced LVEF [21,22,23]. As shown in a large study (n = 1,010), moderate to severe LV systolic dysfunction is a strong predictor of stroke [22].

The relationship between the diagnosis of coronary artery disease (CAD) and the patient’s qualification for TEE is unclear. In this point we want to mention, that the definition of CAD was uniform in our study. Looking for an explanation for this result, we arrived at the large study of over 20,000 patients [24]. The authors showed, that severe diastolic LV dysfunction showed to be “high-risk” features for LA thrombus. In our study we did not have echocardiographic data that would allow us to accurately assess the degree of LV diastolic dysfunction. However, we must remember that patients with AF are usually assumed to have more impaired LV diastolic dysfunction. If they also have CAD diagnosed, it is an additional factor impairing this left ventricular function. Perhaps this is therefore an explanation for our result.
Quite an interesting observation of our study is that hypertension (HT) was one of two factors negatively related to performing TEE before cardioversion. Very likely, the patients with HT, especially those with a low CHA2DS2-VASc score, were perceived as being at lower risk for thrombus and thus were not qualified for prior TEE. This result is significant given the fact that while in the general AF patient population, rate and rhythm control strategies improve the functional status of patients in a comparable manner, rhythm control may be more appropriate for patients with AF and comorbid hypertension [25].

The results of our study prove that the decision to perform TEE before cardioversion is still challenging. Patients with AF are a large and, at the same time, highly diverse group, which, due to many therapeutic dilemmas, requires the cooperation of doctors of many specialties [26]. In many cases, physicians are more conservative than the current recommendations what was also confirmed in the big survey conducted by The European Heart Rhythm Association [27]. Many clinical factors, including the components of the CHA2DS2-VASc scale, predispose doctors to perform an echocardiographic verification, even when the patient declares good therapeutic compliance. These discrepancies prove that individual assessments of patients and physicians’ clinical experience are still the leading determinants of therapeutic decisions where patients’ safety is concerned.

**Strengths and limitations**

Our observations show diagnostic and therapeutic decisions made in AF patients in real-life. It was two-centres’ study with well characterized and quite homogenous group. The limitation of the present study lies primarily in its partly retrospective nature. This obviously limits the completeness of the available data. In this case, we had no information about the reason for the reduced NOAC dose nor did we have any information about the predefined criteria used by doctors in deciding whether to conduct TEE or not. However, it is known that this decision was not made due to technical conditions, such as the inability to perform TEE. We realized,
that this choice of two high-reference cardiology centres can limit generalizability of the study findings. On the other hand, however, a study at the center with no access to TEE would have limited cognitive value. Next limitation of our study is that we had to analyze anteroposterior LA dimension for the determinant of its enlargement. We are aware that the LAV/LAVI would be a better parameter for assessing the LA abnormalities. Finally, we realize that the sample size is not large (especially group of patients treated with apixaban), and our results reflect the diagnostic decisions made in only two Polish cardiology centers; other doctors in other centers may use their own clinical strategies.

Conclusions
The results of our two-center study showed that TEE before elective cardioversion was more frequent in patients with a history of coronary disease, bleeding, and thromboembolic event. Patients with paroxysmal atrial fibrillation and hypertension more often received cardioversion without prior TEE.

Contribution statement
BUŻ and IG conceived the concept of the study. BUŻ, IG and MK contributed to the design of the research. MK and BUŻ analyzed statistically the data. BUŻ, MK and PK analyzed and interpreted the data. BUŻ and MK wrote the manuscript. All authors have made substantial contributions to acquisition of data, to revising it critically for important intellectual content and final approval of the version to be submitted.

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Tables legend:

Table 1. Baseline characteristics of the study population.

Table 2. Factors determining elective cardioversion preceded with transesophageal echocardiography: the results of univariable logistic regression analysis.

Table 3. Factors determining elective cardioversion preceded with transesophageal echocardiography: the results of multivariable logistic regression analysis.
Table 1. Baseline characteristics of the study population.

| Demographic data | All group, n=668 | TEE (-) group, n=306 | TEE (+) group, n=362 | P |
|------------------|------------------|----------------------|----------------------|---|
| Age, y, median (IQR) | 66 (60-72.5) | 66 (59-73) | 66 (60-72) | 0.92 |
| Female, n (%) | 239 (36) | 106 (35) | 133 (37) | 0.63 |
| Type of AF, n (%) | | | | |
| AF paroxysmal | 37 (5.5) | 29 (9.5) | 8 (2.2) | <0.001 |

| Clinical data | | | | |
|---------------|------------------|----------------------|----------------------|---|
| Heart failure, n (%) | 209 (31.4) | 94 (30.7) | 115 (31.9) | 0.83 |
| Hypertension, n (%) | 558 (83.5) | 269 (87.9) | 289 (79.8) | 0.08 |
| Diabetes mellitus, n (%) | 139 (20.8) | 55 (18) | 84 (23.2) | 0.12 |
| Stroke, n (%) | 53 (7.9) | 22 (7.2) | 31 (8.6) | 0.61 |
| Stroke/TIA/thromboembolism, n (%) | 86 (12.9) | 39 (12.7) | 47 (12.9) | 0.93 |
| CHA\textsubscript{2}DS\textsubscript{2}VASc score, median (IQR) | 2 (1-4) | 2 (1-3) | 3 (2-4) | <0.001 |
| CHA\textsubscript{2}DS\textsubscript{2}VASc-RAF score, median (IQR) | 7 (6-9) | 7 (5-8) | 7 (6-9) | <0.001 |
| Impaired renal filtration, eGFR<60ml/min/1.73m\textsuperscript{2}, n (%) | 185 (29.8) | 65 (24.3) | 120 (34) | <0.001 |
| Coronary disease, n (%) | 255 (38.2) | 72 (23.5) | 183 (50.5) | <0.001 |
| History of PCI, n (%) | 66 (9.9) | 39 (12.7) | 27 (7.5) | 0.03 |
| CABG, n (%) | 30 (4.5) | 9 (2.9) | 21 (5.8) | 0.11 |
| MI, n (%) | 53 (7.9) | 30 (9.8) | 23 (6.4) | 0.13 |
| History of bleeding, n (%) | 51 (7.6) | 7 (2.3) | 44 (12.2) | <0.001 |

| Laboratory data, median (IQR) | | | | |
|---------------------|------------------|----------------------|----------------------|---|
| Hemoglobin, g/dl | 14.4 (13.4-15.4) | 14.6 (13.4-15.5) | 14.3 (13.4-15.2) | 0.03 |
| Echocardiography data, n=499 | | | | |
| LVEF (%), median (IQR) | 55 (50-60) | 55 (50-60) | 55 (50-60) | 0.69 |
| LVEF<50%, n (%) | 262/499 (52.5) | 197/395 (49.9) | 65/104 (62.5) | 0.03 |
| Left atrial diameter, mm, median (IQR) | 45 (42-49) | 45 (42-48) | 46 (43-49) | 0.03 |
| Left ventricular diameter, mm, median (IQR) | 51 (47-55) | 50 (47-54) | 52 (48-55) | 0.001 |

| Oral anticoagulation therapy, n (%) | | | | |
|----------------------------------|------------------|----------------------|----------------------|---|
| Dabigatran/rivaroxaban/apixaban | 316 (47.3) / 313 (46.8) / 39 (5.8) | 135 (44.2) / 138 (45.1) / 33 (10.8) | 181 (50) / 175 (48.3) / 6 (1.7) | <0.001 |
| Reduced dose of NOACs | 61 (9.1) | 20 (6.5) | 41 (11.3) | 0.045 |

Abbreviations: AF, atrial fibrillation; CABG, coronary artery bypass graft; eGFR, estimated glomerular filtration rate; IQR, Interquartile Range; LVEF, left ventricular ejection fraction; MI, myocardial infarction; NOACs, novel oral anticoagulants; PCI, percutaneous coronary intervention; TIA, transient ischemic attack.
Table 2. Factors determining elective cardioversion preceded with transesophageal echocardiography: the results of univariable logistic regression analysis.

| Parameter                        | Univariable logistic regression analysis |  
|----------------------------------|-----------------------------------------|
|                                  | OR (95% CI) | P value |
| AF paroxysmal                    | 0.22 (0.09-0.48) | <0.001 |
| Heart failure                    | 1.06 (0.76-1.47) | 0.73   |
| Hypertension                     | 0.54 (0.35-0.84) | 0.005  |
| Diabetes mellitus                | 1.38 (0.95-2.02) | 0.09   |
| Stroke                           | 1.21 (0.68-2.14) | 0.51   |
| Stroke/TIA/Thromboembolism       | 2.26 (1.34-3.81) | 0.002  |
| Coronary disease                 | 3.32 (2.37-4.64) | <0.001 |
| PCI                              | 0.55 (0.33-0.92) | 0.02   |
| CABG                             | 2.04 (0.92-4.53) | 0.07   |
| MI                               | 0.62 (0.35-1.09) | 0.1    |
| History of bleeding              | 5.91 (2.62-13.32) | <0.001 |
| LVEF, %                          | 0.98 (0.97-1.01) | 0.15   |
| LVEF<50%                         | 1.67 (1.07-2.61) | 0.02   |
| Left atrial diameter, mm         | 1.035 (0.99-1.07) | 0.08   |
| Left ventricular diameter, mm    | 1.04 (1.01-1.07) | 0.02   |
| Reduced dose of NOACs            | 1.83 (1.05-3.19) | 0.04   |
| Hemoglobin (per 0.1g/L)          | 0.87 (0.78-0.97) | 0.02   |
| Female                           | 1.09 (0.79-1.51) | 0.58   |
| Impaired renal filtration, eGFR<60ml/min/1.73m² | 1.60 (1.12-2.28) | 0.009 |
| CHA₂DS₂VASc                      | 1.18 (1.07-1.30) | <0.001 |
| Age (per 1 year)                 | 1.00 (0.99-1.02) | 0.81   |

Abbreviations: see Table 1.
Table 3. Factors determining elective cardioversion preceded with transesophageal echocardiography: the results of multivariable logistic regression analysis.

| Parameter                                                        | Multivariable logistic regression analysis |
|-----------------------------------------------------------------|--------------------------------------------|
|                                                                | OR (95% CI) | P value |
| AF paroxysmal                                                   | 0.31 (0.12-0.84) | 0.02    |
| Hypertension                                                    | 0.28 (0.15-0.54) | <0.001  |
| Stroke/TIA/Thromboembolism                                     | 2.36 (1.12-4.97) | 0.02    |
| Coronary disease                                                | 3.92 (2.36-6.51) | <0.001  |
| History of bleeding                                            | 7.92 (2.76-22.69) | <0.001  |
| LVEF<50%                                                        | 1.00 (0.53-1.90) | 0.99    |
| Reduced NOACs                                                   | 2.52 (0.91-6.92) | 0.07    |
| Impaired renal filtration, eGFR<60ml/min/1.73m²                | 1.19 (0.69-2.05) | 0.51    |
| Left ventricular diameter, mm                                  | 1.03 (0.99-1.08) | 0.15    |
| Hemoglobin, g/L                                                 | 0.90 (0.76-1.07) | 0.23    |

Abbreviations: see Table 1.