Long-term antithrombotic therapy after coronary artery bypass grafting in patients with preoperative atrial fibrillation. A nationwide observational study from the SWEDEHEART registry

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Aims To provide data guiding long-term antithrombotic therapy after coronary artery by-pass grafting (CABG) in patients with preoperative atrial fibrillation (AF).

Methods and results From the SWEDEHEART registry, we included all patients, between January 2006 and September 2016, with preoperative AF and CHA_2DS_2-VASC score ≥2, undergoing CABG. Based on dispensed prescriptions 12 to 18 months after CABG, patients were divided in 3 groups: use of platelet inhibitors (PI) only, oral anticoagulant (OAC) only or a combination of OAC + PI. Outcomes were: Major adverse cardiac and cerebrovascular events (MACCE, [all-cause death, myocardial infarction, or stroke]), net adverse clinical events (NACE, [MACCE or bleeding]) and the individual components of NACE. Inverse probability of treatment weighting was used to adjust for the non-randomized study design. Among 2,564 patients, 1,040 (41%) were treated with PI alone, 1,064 (41%) with OAC alone, and 460 (18%) with PI + OAC. Treatment with PI alone was associated with higher risk for MACCE (adjusted HR 1.43, 95% CI 1.09-1.88), driven by higher risk for stroke and MI, compared with OAC alone. Treatment with PI + OAC, was associated with higher risk for NACE (adjusted HR 1.40, 95% CI 1.06-1.85), driven by higher risk for bleeds, compared with OAC alone.

Conclusion In this real-world observational study, a high proportion of patients with AF, undergoing CABG, did not receive a long-term OAC therapy. Treatment with OAC alone was associated with a net clinical benefit, compared with PI alone or PI + OAC. (Am Heart J 2023;257:69–77.)

Keypoints
1. CABG.
2. Atrial fibrillation.
3. Antithrombotic therapy.
4. Platelet inhibition.
5. Oral anticoagulation.

Patients treated with coronary artery bypass graft (CABG) surgery, are recommended antiplatelet treatment indefinitely, to reduce the risk of graft failure.[1-3] More than 10% of patients undergoing isolated CABG have a history of atrial fibrillation (AF).[4] Patients with AF and CHA_2DS_2-VASC ≥2 points (for men) and ≥3 points (for

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women) have a class 1A recommendation for treatment with oral anticoagulant (OAC) in the current European Society of Cardiology (ESC) AF guidelines.[5] In AF patients undergoing CABG, the ESC guidelines recommend 1 year of dual antithrombotic treatment (DAT), with platelet inhibitor (PI) and OAC, followed by OAC alone after 1 year.[6] The latest American College of Cardiology (ACC) scientific statement on secondary prevention after CABG surgery have a similar recommendation.[7] The optimal long-term antithrombotic therapy in CABG patients with AF is unknown and the clinical guideline recommendations are based on expert opinion, with very little data in support of either DAT or OAC alone.

Earlier randomized trials and meta-analyses indicated similar reduction of graft failure with OAC and aspirin respectively, compared with placebo.[1-3,8] Also, it is increasingly recognised (from non-CABG populations) that OAC and aspirin in combination significantly increase bleeding risk; and bleeding complications are associated with the worse outcome.[9-11]

The aims of this study were to describe long-term antithrombotic treatment patterns, and to assess clinical outcomes associated with different antithrombotic treatment strategies, in a population with preoperative AF.

Methods

Study population and data sources

The study population was identified using the Swedish Web-System for Enhancement and Development of Evidence Based Care in Heart Disease Evaluated According to Recommended Therapies (SWEDEHEART) registry (covering all cardiac surgery procedures in Sweden).[12] The SWEDEHEART registry is regularly monitored by external monitors, with over 95% agreement between the registered information and the patientsmedical records.[13] The study database was enriched with data from the Swedish Cause of Death registry, the National Patient Register (NPR) for information on medical history, including information on preoperative AF, and outcomes. NPR includes information on discharge diagnoses according to the International Classification of Disease (ICD) for all patients admitted to Swedish hospitals since 1987, and have shown high validity for registered diagnoses.[14,15] Information on medical treatment, based on Anatomical Therapeutic Chemical (ATC) classification, were collected from the National prescribed drug register.

We identified all patients who had an isolated first-time CABG procedure performed between January 1, 2006 and September 30, 2016 and were alive 1 year after surgery. Follow-up was available until December 31, 2017. Patients were selected for this analysis if they had a history of AF before surgery and a CHA_2DS_2-VASC score of ≥ 2 at the time of surgery (Supplementary Figure S1).

Because the aim of this study was to describe and compare long-term antithrombotic treatment strategies after CABG, follow-up started 1 year after surgery and continued for up to 2 years (3 years after surgery).

The manuscript was structured according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[16]

Exposure

Based on dispensed antithrombotic drugs 12 to 18 months after surgery, the study population was categorized in 3 treatment groups: (1) PI alone. (2) OAC alone. (3) PI+OAC. PI included aspirin, clopidogrel, ticagrelor, and prasugrel. OAC included warfarin, edoxaban, rivaroxaban, apixaban, and dabigatran. Treatment allocation was based on dispensed drugs over a 6-month period. In Sweden, a prescription usually covers 3 months of treatment. To allow minor delays in compliance and account for the possibility that a patient had a prescription dispensed twice during the same 3-month period, a patient was defined as being on a certain treatment if the drug was prescribed any time during two consecutive 3-month periods. Each patient was allowed at least 3 months to collect the prescribed medication (or not) at the beginning of the study period. Almost 9 in 10 patients had their prescribed drug dispensed during the first 3 months of follow-up after study start.

Ethical considerations

The study was performed in accordance with the 1975 Declaration of Helsinki and was approved by the Regional Ethical Review Board in Gothenburg (Dnr. 139-16). Patients included in the SWEDEHEART registry were informed, before inclusion, about their participation in the registry and the right to opt out.

Outcome definitions

The 2 co-primary outcomes were major adverse cardiac and cerebrovascular events (MACCE), including all-cause mortality, myocardial infarction (MI), or stroke, and net adverse clinical events (NACE), defined as MACCE, or any major bleeding over the same period. Secondary outcomes were the individual components of NACE. MI, stroke, and major bleeding outcomes were captured by rehospitalisation diagnoses (Supplementary Table SI).

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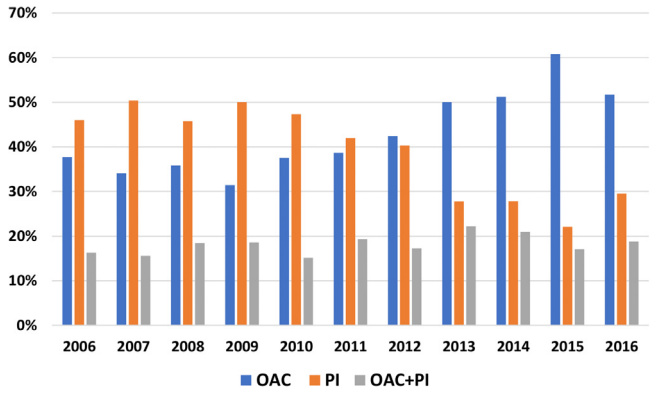
Figure 1



Changes in treatment strategies over time Temporal changes of antithrombotic treatments (platelet inhibition only [PI], oral anticoagulation only [OAC] and OAC plus PI) one year after coronary artery by-pass grafting surgery CABG. OAC alone was increasingly used, in favour of PI alone.

Statistical analysis

Continuous variables are presented as mean with standard deviation (SD) or as median with interquartile ranges, and categorical variables as counts with percentages. Baseline and peri-procedural characteristics were compared according to treatment group by χ^2 tests for categorical variables and Studentś *t* test or Mann - Whitney test for continuous variables. A 2-sided *P*-value <0.05 was considered statistically significant.

Patients were followed for a minimum of three months and up to 2 years or to the time of an event. Median follow-up was 730 days and mean follow-up was 683 days. Cumulative event rates were estimated by the Kaplan-Meier method.

To compare outcomes between treatment groups, Cox proportional hazard models were used to calculate hazard ratios (HR) and 95% confidence intervals. PI alone and PI + OAC were compared pairwise to OAC alone as the reference group. In the unadjusted models, treatment was the only explanatory variable. The assumptions of proportional hazard were reviewed using log-minus-log survival plots and by a formal test based on Schoenfeld residuals, indicating no violation. To adjust for the non-randomized selection of treatment, we calculated the individual propensity score (PS), reflecting the individualś probability to be treated with PI (in the comparison of PI vs OAC) using a logistic regression analysis. The variables included in the logistic regression are presented in the supplement (Supplementary Table II and III). Based on the individual PS, we calculated the stabilized inverse probability of treatment weights (IPTW). Details regarding IPTW analyses, sensitivity analyses and handling of missing data, see Supplement statistics section.

Statistical analysis was performed by using SPSS software, release 23.0 (SPSS Inc) and STATA v 15.0 (StataCorp LLC).

Results

In total 37,876 patients underwent isolated CABG between January 1, 2006 and September 30, 2016. Of these, 2,564 (19.6 % women and 80.4 % men) fulfilled the inclusion and exclusion criteria and were included in our study population. (Supplementary Figure S1) Over the study time, the proportion of patients treated with PI alone decreased and the proportion of patients treated with OAC alone increased (Figure 1). Also, the proportion of direct acting oral anticoagulants (DOAC) increased over time. (Supplementary Figure S6)

One year after surgery, 41% of the patients were treated with PI alone and 41% with OAC alone, while 18% were treated with PI + OAC.

Baseline characteristics are presented in Table 1. In summary, patients on OAC alone were older, with higher CHA_2DS_2-VASC score and higher rate of previous heart failure but had less MI before surgery compared to the other study groups.

During the first year after surgery (before the beginning of the study period), the proportions of patients readmitted for an MI were 2.2 %, 1.2%, 3.0 %, for stroke 2.1 %, 2.6 %, 1.5 % and for bleeding events 4.2 %, 5.6 %, 4.1 % in the PI only, OAC only, and PI + OAC group, respectively (Supplementary Table S9).

Outcomes

Over 2 years follow-up (starting 1 year after surgery) MACCE occurred in 13.1%, 10.5%, and 12.1%; and NACE occurred in 16.9%, 13.7%, and 18.9% in patients treated

Table 1. Baseline characteristics

	Platelet inhibition $n = 1,040$	Oral anticoagulation $n = 1,064$	OAC + PI $n = 460$	*P*-value
Demographics				
Female sex	218 (21.0)	201 (18.9)	83 (18.0)	.321
Age, years, mean ±SD	71.8 ± 7.7	73.3 ± 6.6	71.9 ± 6.8	<.001
Age ≥ 75 years	430 (41.3)	523 (49.2)	169 (36.7)	<0,001
Medical history				
Diabetes	382 (37.3)	357 (34.0)	174 (38.2)	.171
Hyperlipidaemia	376 (36.2)	366 (34.4)	182 (39.6)	.155
Hypertension	723 (69.5)	805 (75.7)	352 (76.5)	.001
Previous MI	660 (63.5)	521 (49.0)	255 (55.4)	<.001
Previous PCI	186 (21.3)	160 (17.2)	85 (21.4)	.050
ACS < 6 weeks before surgery	687 (66.1)	621 (58.4)	304 (66.1)	<.001
Stroke	96 (9.2)	123 (11.6)	56 (12.2)	.122
TIA	93 (8.9)	116 (10.9)	49 (10.7)	.372
PAD	118 (11.3)	133 (12.5)	65 (14.1)	.310
COPD	114 (11.0)	104 (9.8)	39 (8.5)	.316
Heart failure	268 (25.8)	392 (36.8)	165 (35.9)	<.001
Renal failure*	66 (6.3)	58 (5.5)	23 (5.1)	.698
Previous major bleeding	83 (8.0)	79 (7.4)	34 (7.4)	.869
History of cancer	183 (17.6)	198 (18.6)	75 (16.7)	.546
CHA_2DS_2-VASC, mean ±SD	3.9 ±1.5	4.1 ±1.5	4.0 ±1.5	.001
Laboratory and perioperative data				
Weight, kg, mean ±SD	82.3 ± 15.1	85.4 ± 15.3	86.1 ± 16.7	<.001
BMI, kg/m^2, mean ±SD	27.3 ± 4.4	27.9 ± 4.3	28.1 ± 4.6	.002
Median GFR, MDRD, ±SD, ml/min/1.73m2	62.2 ± 24.6	60.0 ± 23.3	59.7 ± 22.7	.077
GFR, MDRD, <60 ml/min/1.73m2	453 (43.6)	522 (49.0)	232 (50.4)	.011
LVEF <50 %	403 (39.1)	518 (49.0)	233 (50.9)	<.001
Peripheral anastomoses, mean ±SD†	3.1 ± 1.1	3.0 ± 1.1	3.1 ± 1.1	.140
Radial artery graft	20 (2.3)	23 (2.6)	17 (3.7)	.537
LIMA/RIMA	771 (87.4)	772 (88.1)	329 (87.5)	.949
Maze procedure±	110 (10.6)	126 (11.8)	67 (14.6)	.088
Postoperative bleeding	41 (4.1)	30 (2.9)	15 (3.3)	.332
Medication at the start of the study period				
β-blockers	891 (86.1)	929 (87.7)	402 (87.8)	.474
ACE-I / ARB	780 (75.5)	845 (79.9)	388 (84.9)	<.001
Statins	910 (87.9)	920 (87.0)	417 (91.2)	.059
Spironolactone	116 (11.3)	205 (19.7)	77 (17.1)	<.001
Diuretics	453 (44.1)	569 (54.4)	247 (54.8)	<.001
Aspirin	1010 (97.1)	0	439 (95.4)	
P2Y12 inhibitor	97 (9.3)	0	40 (8.7)	
Dual antiplatelet therapy	67 (6.5)	0	19 (4.2)	
Oral anticoagulant (DOAC or VKA)	0	1064 (100)	460 (100)	
DOAC	0	166 (15.8)	57 (12.4)	
Dual Antithrombotic therapy	0	0	441 (95.8)	
Triple Antithrombotic therapy	0	0	19 (4.2)	

Results are presented as numbers, percentages unless otherwise indicated.

Abbreviations (in order of appearance): OAC, oral anticoagulant; PI, platelet inhibitor; SD, standard deviation; MI, myocardial infarction; PCI, percutaneous coronary intervention; ACS, acute coronary syndrome; TIA, transient ischemic attack; PAD, peripheral artery disease; COPD, chronic obstructive pulmonary disease; BMI, body mass index; MDRD, modification of diet in renal disease; GFR, glomerular filtration rate; LVEF, left ventricular ejection fraction; LIMA, left anterior mammary artery; RIMA, right anterior mammary artery; ACE-I, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; VKA, vitamin K antagonist; DOAC, direct acting oral anticoagulant.

* Defined as previous hospitalisation with any of the diagnoses ICD N17-N19.

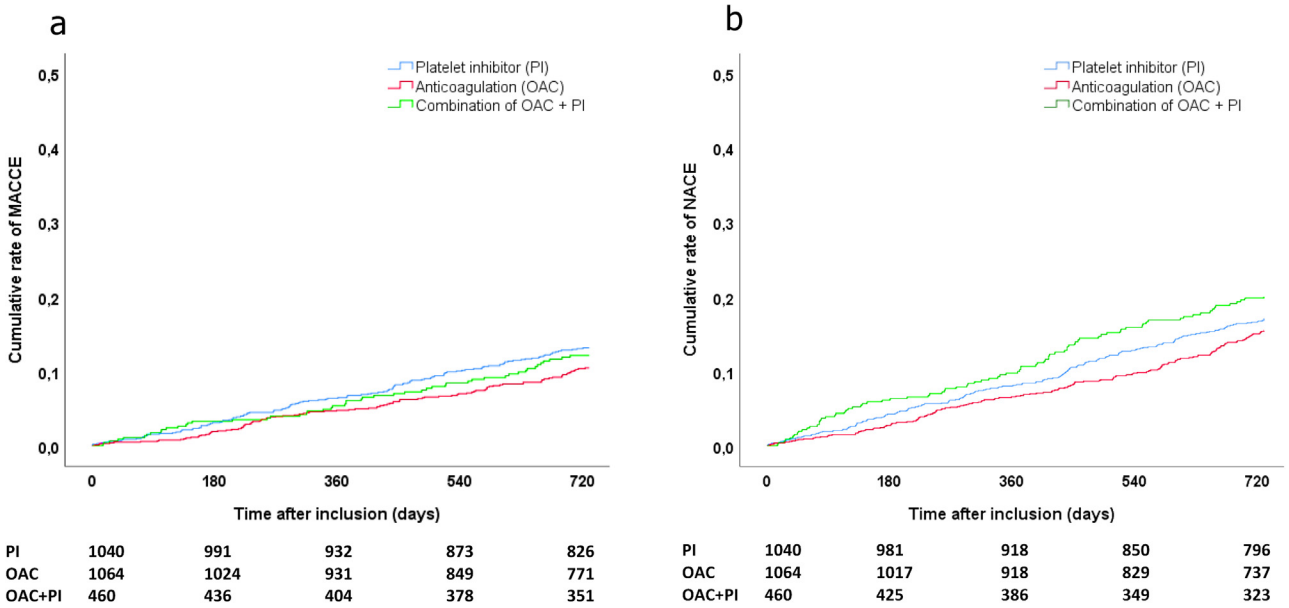
† Numbers presented exclude LIMA/RIMA.

± Predominantly isolation of pulmonary veins.

with PI alone, OAC alone, and a combination of PI and OAC, respectively (Figure 2A and B).

After adjustment, PI alone was associated with higher risk for MACCE compared with OAC alone (adjusted HR 1.43, 95% CI 1.09-1.88), whereas there was no significant difference between the combination of PI + OAC and OAC alone (adjusted HR 1.17, 95% CI 0.82-1.65). The risk for NACE was significantly higher with PI alone (adjusted

Figure 2



(A) Major adverse cardiac and cerebrovascular events Kaplan-Meier estimates of major adverse cardiac and cerebrovascular events (MACCE) associated with different antithrombotic treatments (platelet inhibition only [PI], oral anticoagulation only [OAC] and OAC plus PI), over up to 2 years follow-up, starting one year after coronary artery by-pass grafting surgery. Numbers of patients at risk are presented below the figure. (**B)** Net adverse clinical events Kaplan-Meier estimates of net adverse clinical events (NACE) associated with different antithrombotic treatments (platelet inhibition only [PI], oral anticoagulation only [OAC] and OAC plus PI), over up to 2 years follow-up, starting one year after coronary artery by-pass grafting surgery. Numbers of patients at risk are presented below the figure.

HR 1.32, 95% CI 1.04-1.66) or the combination PI + OAC (adjusted HR 1.40, 95% CI 1.06-1.85), compared with OAC alone. PI alone was associated with higher risk for MI and stroke compared with OAC alone, while the combination of PI + OAC was associated with higher risk for bleeding complications, compared with OAC alone (Table 2). In an exploratory sub-group analysis, numerically the combination of OAC and PI was associated with increased MACCE and NACE irrespective of whether DOAC or VKA was used. (Supplementary Table S10)

Sensitivity analyses

All sensitivity analyses, including inclusion of calendar year, were in line with the primary analyses and in support of the conclusion (Supplementary Table S4-S8).

Discussion

The 2 major findings of this study were: (1) More than 40% of AF patients undergoing CABG, with a CHA_2DS_2-VASC score $\geq$ 2, were not treated with guideline-recommended OAC 1 year after surgery. (2) Antithrombotic treatment strategies were associated with clinical outcomes. Compared with OAC alone, PI alone was associated with a higher risk for MACCE, (driven by higher risk for stroke and MI) and PI+OAC was associated with higher risk for NACE, (mainly driven by higher risk for bleeding events).

In large randomized clinical trials (RCT) on non-CABG patients with AF, OAC has been more efficient than platelet inhibitors (including DAPT), to lower the risk of thromboembolic events, especially stroke,[17,18] and is therefore strongly recommended in clinical guidelines.[5] The rate of OAC use in this study population may appear low. However, and in line with our findings, previous reports from non-CABG populations have shown that a substantial proportion of eligible patients in real-world AF populations do not receive OAC, sometimes because of perceived high bleeding risk.[19-22] AF has been associated with thrombotic events also in CABG patients.[23-26] Data on antithrombotic treatment patterns in real-world CABG patients with preoperative AF are scarce, but one analysis indicated that less than half of those patients were discharged with OAC,[4] which is in line with our findings. In this study, we extend current knowledge, showing higher stroke risk associated with PI alone also in AF patients treated with CABG, highlighting the importance of OAC treatment to reduce stroke risk in post-CABG patients with a history of AF and a CHA_2DS_2-VASC score $\geq$2. We found an increase in OAC treatment over

Table 2. Outcomes

	Platelet inhibition $n = 1,040$	Oral anticoagulation $n = 1,064$	OAC+PI $n = 460$
MACCE, *n* (%)	131 (13.1)	101 (10.5)	52 (12.1)
Crude	1.29 (1.00-1.68)	1.00	1.18 (0.84-1.65)
IPTW	1.43 (1.09-1.88)	1.00	1.17 (0.82-1.65)
NACE, *n* (%)	180 (18.1)	154 (16.1)	90 (20.9)
Crude	1.15 (0.93-1.44)	1.00	1.38 (1.06-1.79)
IPTW	1.27 (1.01-1.60)	1.00	1.37 (1.04-1.80)
All-cause death, *n* (%)	62 (6.3)	67 (7.0)	23 (5.5)
Crude	0.90 (0.63-1.26)	1.00	0.77 (0.48-1.23)
IPTW	1.08 (0.75-1.55)	1.00	0.83 (0.50-1.38)
MI, *n* (%)	38 (3.8)	15 (1.6)	14 (3.3)
Crude	2.52 (1.39-4.58)	1.00	2.14 (1.03-4.43)
IPTW	2.31 (1.24-4.29)	1.00	1.74 (0.82-3.67)
Stroke, *n* (%)	50 (5.1)	28 (2.9)	17 (4.0)
Crude	1.77 (1.11-2.81)	1.00	1.38 (0.75-2.51)
IPTW	1.78 (1.10-2.88)	1.00	1.33 (0.72-2.49)
Bleeding, *n* (%)	71 (6.3)	70 (5.7)	50 (10.2)
Crude	1.04 (0.72-1.39)	1.00	1.66 (1.15-2.38)
IPTW	1.06 (0.75-1.51)	1.00	1.71 (1.17-2.50)

Results are presented as Hazard Ratios (HR) and 95% confidence intervals unless otherwise indicated. No adjustment for multiple testing was performed. Abbreviations (in order of appearance); OAC, oral anticoagulant; PI, platelet inhibition; MACCE, major adverse cardiac and cerebrovascular events; IPTW, inverse probability of treatment weighted; NACE, net adverse clinical events; MI, myocardial infarction. PI only and PI + OAC were compared with OAC alone (reference) in a pairwise fashion.

time, which is encouraging, but efforts should be made to increase the use of OAC in high-risk patients with AF to further improve long-term outcome in post-CABG patients.

We observed a higher rate of MI associated with PI alone compared with OAC alone. Sensitivity analyses, excluding patients with a clinical event during the first year after surgery or DAPT 12 to 18 months after CABG, gave similar result, showing higher risk associated with PI alone. Supporting our findings, a previous study on patients with AF and stable coronary artery disease, found that OAC alone was associated with lower risk of a new coronary event compared with PI alone (single or dual), and also compared with OAC plus PI.[27] In addition, the ACTIVE W trial, comparing OAC with DAPT in AF patients unrelated to CABG, was prematurely terminated because of higher rate of thromboembolic events associated with DAPT. In addition to a decreased stroke rate, the ACTIVE W trial indicated a 36% decrease in the risk of MI with OAC alone.[17] Also supporting our findings, older trials in non-AF patients showed that OAC was superior to aspirin in reducing ischemic events after MI.[28] AF has been considered a prothrombotic state, with more fibrin rich thrombi, (including coronary thrombi), possibly indicating better effect with OAC treatment, which may explain extra benefit from OAC treatment in such patients.[29]

Graft failure, and subsequent ischemia, is a feared complication after CABG, but studies regarding the clinical consequences of graft patency have shown contradictory results.[3,30] This is probably explained by differences in the importance of the afflicted graft.[30] Nevertheless, post-CABG treatment with antiplatelets has been shown to increase graft patency[1] and lower mortality and morbidity,[1,31] and is strongly advocated in guidelines, lifelong for patients without AF (Class 1, Level of evidence A).[32,33] However, 2 older studies indicated similar efficacy with OAC and aspirin on graft patency.[8,34] Little is known on the subject for AF patients undergoing CABG; but our data indicate that, at least after 1 year, OAC alone should be the preferred treatment strategy.

In the present population, adding PI (single or dual) to OAC was not associated with a decrease in ischemic events compared to OAC alone. The combination was associated with an increased NACE rate, driven by an increase in bleeding events. There are no RCTs comparing PI plus vitamin K antagonists (VKA) (the most frequently used OAC in our study) with OAC alone after CABG. Supporting a net benefit with VKA alone compared with VKA+ aspirin, previous trials in MI patients (without AF) have shown similar rates of ischemic events, but higher bleeding risk with VKA + aspirin.[28] Also supporting our findings, one study on patients with AF (unrelated to CABG) and stable coronary artery disease showed no benefit from a combination of PI and OAC, but indicated increased MI/Coronary deaths with DAPT or clopidogrel added to OAC, in addition to a significant increase in bleeding risk.[27] In addition, the recently published COMPASS-CABG trial reported similar graft patency, with no significant difference between aspirin, rivaroxaban or aspirin+rivaroxaban.[35] Notably, the COMPASS-CABG trial did not include patients with an established indication for OAC, and the rivaroxaban doses were lower than doses used for stroke prevention in AF. Further sup-

porting long-term treatment with OAC alone, a recently published trial comparing rivaroxaban and the combination of rivaroxaban and PI, in patients with AF that had percutaneous coronary intervention (PCI), or CABG (only 252 individuals or about 11% of the study population) performed, or who had angiographically confirmed coronary artery disease not requiring revascularization, more than 1 year earlier, was recently published. Treatment with rivaroxaban alone was associated with a lower rate of CV events or death and with a lower rate of major bleeding compared with combination therapy.[36]

Finally, we observed substantially higher bleeding rate associated with PI + OAC compared with OAC alone, which has been shown in non-CABG populations.[37,38] Increased bleeding risk with the combination of PI + OAC compared with OAC alone has been shown also when a direct oral anticoagulant (DOAC) was used as OAC.[36,39] Bleeding complications have repeatedly been associated with worse outcomes,[9] and strategies to avoid bleeding complications are recommended in clinical guidelines.[40]

Antithrombotic treatment is a delicate balance aiming at decreased thrombotic events without unnecessary increase in bleeding complications. The difficulty of this clinical issue comes to a head in patients with an indication, or a perceived indication, for both OAC and PI. We provide data suggesting that OAC alone should be the preferred choice for long-term antithrombotic treatment in patients with AF which should help caregivers making informed decisions in clinical practice. The optimal timepoint to drop PI is still not known. There may well be a need for PI early after surgery, and future studies should explore the earlier postoperative period.

Strengths and limitations

A strength of this study is the inclusion of a nation-wide all-comers population. There are, however, some important limitations. First, this was an observational study with its inherent limitations including the possibility of residual confounding (eg, falls or minor bleeding events not diagnosed as bleeding in NPR). To deal with this inherent limitation, we used appropriate statistical methods, including IPTW analyses, to compensate for the non-randomized study design. After adjustment, the 2 groups were well balanced. In addition, 4 sensitivity analyses excluding patients with MI, stroke, new revascularization or bleeding the first year after CABG or DAPT before or at the beginning of the study period did not significantly change the conclusions. Second, baseline characteristics used in the PS analysis were diagnosed over several years before the time of surgery. However, baseline medication was updated 1 year after CABG. Third, the population size, especially regarding the combination of PI + OAC, was relatively small, and minor differences between the groups may have remained undetected. Even so, there is a knowledge gap regarding the optimal long-term antithrombotic treatment strategy in these patients and we believe our findings provide important insights. Fourth, we did not adjudicate outcome events. However, validation of the administrative data used in the analysis, has been performed, showing high accuracy.[14] Fifth, changes in treatment over time were not accounted for. However, treatment allocation was based on dispensed medication which we believe better reflect actual treatment compared with for example, discharge prescriptions. Finally, most of the patients were treated with VKA. To assess long-term outcome some years back were included in the study cohort. However, previous studies have indicated that a combination of DOAC and PI is also associated with increased bleeding risk compared with DOAC alone, in non-AF CABG patients[35] and non-CABG patients with an indication for OAC.[39] To our knowledge, there is no previous data for AF patients undergoing CABG.

Conclusion

In this real-world observational study, a high proportion of patients with AF, undergoing CABG, did not receive long-term OAC therapy, 1 year after surgery. Treatment with OAC alone was associated with a net clinical benefit, compared to PI alone or PI + OAC. Our data support current ESC and ACC guidelines suggesting OAC monotherapy as the preferable long-term antithrombotic treatment in AF patients undergoing CABG.

Disclosures

JA reports lecture fees from Boehringer Ingelheim (outside the context of this work). Advisory board for Astra Zeneca (outside of context of this work). GB reports lecture fees Boehringer Ingelheim, Astra Zeneca (outside the context of this work). Advisory board Novo Nordisk (outside of context of this work). AJ reports consultancy fees or lectures fees from Werfen, Boehringer-Ingelheim, Portola, Baxter and LFB (outside of context of this work).

MS, DV, AA, ÖF, RH, MJ, LOK, SSL, SJN has nothing to declare.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ahj.2022.12.001.

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