Proximal Occlusion in the Right Coronary Artery Involving the Atrial Branch as a Strong Predictor of New-Onset Atrial Fibrillation in Acute Myocardial Infarction

Taiki Shiba,1,2 MD, Yusuke Kondo,3 MD, Keitaro Senoo,3 MD, Masahiro Nakano,3 MD, Kenji Okubo,1 MD, Naoki Ishio,1 MD, Nobuaki Shikama,1 MD and Yoshio Kobayashi,2 MD

Summary

Although atrial ischemic damage is an atrial fibrillation (AF) risk factor, the impact of atrial branches’ occlusion on AF development after acute myocardial infarction (AMI) is unclear. Therefore, this study’s purpose was to identify predictors of new-onset AF with regard to atrial branches’ occlusion. We retrospectively analyzed the AMI database at our single center. Consecutive patients with AMI from June 2011 to May 2017 were enrolled. Exclusion criteria were prior AF before AMI, hemodialysis, and follow-up of < 30 days. The study enrolled 204 consecutive patients (follow-up, 543 ± 469 days; age, 66 ± 12 years; male sex, 77%). All patients underwent primary percutaneous coronary intervention. Thirty-six patients (18%) had new-onset AF in the hospital after AMI. The Killip classification ≥ 3 (41% versus 7%, \(P < 0.001\)), ejection fraction ≤ 35% (19% versus 5%, \(P = 0.014\)), ischemic occlusion of atrial branches (58% versus 28%, \(P < 0.001\)), and ischemic occlusion of atrial branches originating from the right coronary artery (52% versus 18%, \(P < 0.001\)) were more frequent in patients with new-onset AF. Multivariable logistic regression analysis showed that Killip classification ≥ 3 (odds ratio, 6.97; 95% confidence interval [CI], 2.77-17.52; \(P < 0.001\)), and ischemic occlusion of the atrial branch of the right coronary artery (odds ratio, 4.35; 95% confidence interval, 1.91-9.93; \(P < 0.001\)) were independent predictors of new-onset AF. Altogether, proximal occlusion in the right coronary artery involving the atrial branch is a strong predictor of new-onset AF after AMI.

Key words: Atrial ischemia, Atrial fibrillation

Atrial fibrillation (AF) is a common cardiac arrhythmia associated with increased cardiovascular mortality in patients with acute myocardial infarction (AMI).1,2 Both AF and AMI have increased incidence with advancing age, and AMI is associated with a sharp increase in AF occurrence. The incidence of AF among patients with myocardial infarction varies between 2% and 22%.1,2 AF occurs when structural and/or electrophysiological abnormalities change atrial tissue to facilitate abnormal impulse formation and/or propagation in addition to a combination of multiple factors, such as genetic components, heart failure, atrial stretch and ischemia, sympathovagal influences, inflammation, and fibrosis.3,4 A systematic review showed that advanced age, heart failure symptoms, and depressed left ventricular function are potential AF predictors in the setting of AMI.5 Several prior animal studies have associated coronary artery occlusion with atrial tachyarrhythmia.6,7 In humans, selective atrial artery occlusion during elective percutaneous transluminal coronary angioplasty, not in the AMI setting, is associated with myocardial ischemic damage, atrial arrhythmias, and intra-atrial conduction delay.8,9 In the AMI setting, some reports have demonstrated that sinus node artery and atrial branches affect AF development.5,6,10 However, these reports did not consider the relationship between coronary artery occlusion involving atrial branches and other AF factors, including advanced age, heart failure symptoms, and depressed left ventricular function. Little is known about the impacts due to coronary artery occlusions involving atrial branches on AF development after AMI. Therefore, the purpose of this study was to identify the predictors of new-onset AF in consideration of coronary artery occlusions involving atrial branches.

Methods

Study design: This study retrospectively analyzed the AMI database of the Chiba Aoba Municipal Hospital in Japan. We enrolled consecutive patients with AMI from June 2011 to May 2017. Patients who met any of the following criteria were not eligible for the study: (1) patients...
with prior AF; (2) patients with hemodialysis; and (3) patients with a follow-up duration shorter than 30 days. The hospital’s ethics committee approved this study.

**Definitions:** AMI was defined as a composite of ST elevation myocardial infarction (MI) and non-ST elevation MI, and diagnosed in patients with chest symptoms and elevated biochemical markers of myocardial damage (troponin I levels ≥ 0.1 ng/mL or creatine phosphokinase [CK] levels two-fold above the normal range). AF history was defined as AF documented by 12-lead electrocardiography (ECG) or Holter ECG monitoring. New-onset AF was defined as AF documented by 12-lead ECG or Holter ECG monitoring detected after AMI during hospitalization. The atrial branch is a coronary artery that runs from the right coronary artery or left circumflex artery to the atrium. Coronary artery occlusion involving atrial branches was defined as follows: the location of the atrial branch was distal to the culprit lesion in AMI, and the peak CK level was more than 1000 IU/L (Figure 1). Stroke was defined as a composite of cerebral infarction and cerebral hemorrhage diagnosed by an experienced neurologist based on the patient’s history, symptoms, and imaging findings.

**Statistical analysis:** Categorical variables are expressed as a number and percentage. These variables were compared using Fisher exact tests. Continuous variables are presented as a mean value ± standard deviation, and they were compared using the Student t-test. The related variables in univariate analysis (P < 0.10) were used as variables in the stepwise forward selection method of multivariable logistic regression analysis. Multivariable logistic regression analysis was used to identify clinically relevant factors of new-onset AF and to calculate odds ratio (OR) and 95% confidence intervals (95% CI). Cox hazard regression analysis was performed to assess the predictor of cardiogenic stroke events. The associated variables in univariate analysis (P < 0.10) were included in the model with the stepwise forward selection method to calculate the hazard ratio (HR) and 95% CIs. IBM SPSS Statistics 23.0 software (IBM Corp., Armonk, NY, USA) was used to perform all analyzes. A P-value < 0.05 was considered statistically significant in all analyzes.

**Results**

**Patient characteristics:** This study enrolled 204 consecutive patients (follow-up period, 543 ± 469 days; age, 66 ± 12 years; male sex, 77%). Of those, 36 patients (18%) had new-onset AF during hospitalization after AMI. All patients underwent primary percutaneous coronary intervention. Figure 2 demonstrates the study flow chart. Baseline characteristics, except the estimated glomerular filtration rate, were not significantly different between patients with and without new-onset AF; these data are presented in Table I.

**Clinical features:** Table II presents the patients’ clinical characteristics. Killip classification ≥ 3, ejection fraction ≤ 35%, and right coronary artery occlusion involving the atrial branch were more prevalent in patients with new-onset AF than in those without new-onset AF. During the study period, 249 patients with AMI underwent percutaneous coronary intervention from June 2011 to May 2017. Thirty-seven patients who had been followed up for less than 30 days were excluded. We also excluded eight patients with a history of AF or hemodialysis. The remaining 204 patients were included in the final analysis. Rates of cardiac assist device use and the culprit lesion of AMI were significantly different between the two groups (Table II).

**Medication at discharge:** Medical therapies at discharge were significantly different in several aspects between the two groups (Table III). Aspirin and thienopyridines were prescribed more at discharge in patients without new-onset AF than in those with new-onset AF, while oral anticoagulants, beta-blockers, and amiodarone were prescribed more in patients with new-onset AF than in those without new-onset AF. There were no significant differences in the prescription of other medications in the two groups.

**Clinical outcomes:** Clinical outcomes between the two groups are shown in Table IV. Patients with new-onset AF had higher events of all strokes and cardiogenic strokes than those without new-onset AF. All-cause death during
Single center database from June 2011 to May 2017

Patients with acute myocardial infarction performed PCI

| n = 249 |
|--------|
| n = 45 |
| Follow-up period was shorter than 30 days. n = 37 |
| death n = 12 other events n = 5 (transfer from our hospital to another) no follow up n = 20 Prior history of AF n = 7 Hemodialysis n = 1 |
| n = 204 |

Patients with new onset transient AF

| n = 36 (18%) |

Patients without new onset transient AF

| n = 168 (82%) |

Figure 2. Study flow chart. During the study period, 249 patients with acute myocardial infarction underwent percutaneous coronary intervention (PCI) from June 2011 to May 2017. Thirty-seven patients who had been followed up for less than 30 days were excluded. We also excluded eight patients with a history of atrial fibrillation (AF) or hemodialysis. The remaining 204 patients were included in the final analysis. AF indicates atrial fibrillation; and PCI, percutaneous coronary intervention.

Table 1. Study Patients’ Baseline Characteristics

|                     | Overall (n = 204) | Patients with new-onset AF (n = 36) | Patients without new-onset AF (n = 168) | P-value |
|---------------------|------------------|----------------------------------|----------------------------------------|---------|
| Age (years)         | 66 ± 12          | 69 ± 9                           | 66 ± 12                                 | 0.15    |
| Age ≥ 65            | 127 (62%)        | 26 (72%)                         | 101 (60%)                               | 0.17    |
| Male                | 157 (77%)        | 25 (69%)                         | 132 (79%)                               | 0.23    |
| BMI (kg/m²)         | 24 ± 4           | 24 ± 4                           | 25 ± 4                                  | 0.16    |
| eGFR (mL/minute/1.73 m²) | 65 ± 9           | 57 ± 20                          | 67 ± 19                                 | 0.003   |
| eGFR ≤ 30           | 12 (6%)          | 4 (11%)                          | 8 (5%)                                  | 0.14    |
| HT                  | 150 (74%)        | 23 (64%)                         | 127 (75%)                               | 0.14    |
| DL                  | 136 (67%)        | 25 (69%)                         | 111 (66%)                               | 0.69    |
| DM                  | 70 (34%)         | 10 (28%)                         | 60 (35%)                                | 0.36    |
| Current smoker      | 71 (35%)         | 13 (36%)                         | 58 (35%)                                | 0.85    |
| Prior MI            | 14 (7%)          | 1 (3%)                           | 13 (8%)                                 | 0.28    |
| Prior PCI           | 11 (5%)          | 1 (3%)                           | 10 (6%)                                 | 0.44    |
| Prior stroke        | 16 (8%)          | 5 (14%)                          | 11 (7%)                                 | 0.13    |
| PAD                 | 3 (1%)           | 1 (3%)                           | 2 (1%)                                  | 0.47    |
| Dementia            | 3 (1%)           | 0 (0%)                           | 3 (2%)                                  | 0.41    |
| CHADS₂ score        | 1.6 ± 1.1        | 1.9 ± 1.3                        | 1.6 ± 10                                | 0.16    |
| CHA₂DS₂-VASc score  | 3.2 ± 1.4        | 3.9 ± 1.4                        | 3.4 ± 1.4                               | 0.04    |
| HASBLED score       | 2.4 ± 0.7        | 2.6 ± 0.7                        | 2.4 ± 0.7                               | 0.15    |

AF indicates atrial fibrillation; BMI, body mass index; eGFR, estimated glomerular filtration rate; HT, hypertension; DL, dyslipidemia; DM, diabetes mellitus; MI, myocardial infarction; PCI, percutaneous coronary intervention; and PAD, peripheral arterial disease.

Predictors of new-onset atrial fibrillation: Multivariable logistic regression analysis showed that the Killip classification ≥ 3 (OR, 6.97; 95% CI, 2.77-17.52; P < 0.001) and right coronary artery occlusion involving the atrial branch (OR, 4.35; 95% CI, 1.91-9.93; P < 0.001) were independent predictors of new-onset AF (Table V).

Stroke events during the follow-up period: Cox regression analysis showed that prior stroke (HR, 11.14; 95% CI, 2.48-50.08; P = 0.002) and new-onset AF (HR, 9.95; 95% CI, 1.81-54.52; P = 0.008) were independent predictors of cardiogenic stroke events (Table VI). Details of all seven patients with cardiogenic strokes in the follow-up period are shown in Table VII. Five of seven patients with cardiogenic strokes had new-onset AF. Only one of these five patients with new-onset AF had received anticoagulation therapy at discharge after AMI.

Discussion

The main findings of this study were that a Killip
AF indicates atrial fibrillation; STEMI, ST-segment elevation myocardial infarction; VA-ECMO, veno-atrial extracorporeal membrane oxygenation; IABP, intraaortic balloon pumping; CK, creatine kinase; EF, ejection fraction; RCA, right coronary artery; LCX, left circumflex artery; LMT, left main trunk; DES, drug elution stent.

Table II. Study Patients’ Clinical Features

|                        | Overall (n = 204) | Patients with new-onset transient AF (n = 36) | Patients without new-onset transient AF (n = 168) | P-value |
|------------------------|------------------|---------------------------------------------|--------------------------------------------------|---------|
| STEMI                  | 139 (68%)        | 28 (78%)                                    | 111 (66%)                                        | 0.17    |
| Killip 3.4             | 28 (14%)         | 15 (42%)                                    | 13 (8%)                                          | <0.001  |
| Cardiac assist device  |                  |                                             |                                                  |         |
| (VA-ECMO and IABP)     | 14 (7%)          | 5 (14%)                                     | 9 (5%)                                           | 0.066   |
| Peak CK (UI)           |                  |                                             |                                                  |         |
| ≥ 2998                 | 2557 ± 2998      | 3809 ± 4176                                 | 2288 ± 2619                                      | 0.02    |
| Peak CK ≥ 3000 (UI)    | 59 (29%)         | 14 (39%)                                    | 45 (27%)                                         | 0.14    |
| EF (%)                 | 55 ± 13          | 54 ± 14                                     | 56 ± 13                                          | 0.30    |
| EF ≤ 35%               | 16 (8%)          | 7 (19%)                                     | 9 (5%)                                           | 0.014   |
| Left atrial diameter   |                  |                                             |                                                  |         |
| (mm)                   | 34 ± 5           | 35 ± 7                                      | 34 ± 5                                           | 0.65    |
| Ischemic occlusion of  |                  |                                             |                                                  |         |
| atrial branches        | 69 (34%)         | 21 (58%)                                    | 48 (29%)                                         | <0.001  |
| Originated from RCA    | 49 (24%)         | 19 (53%)                                    | 30 (18%)                                         | <0.001  |
| Originated from LCX    | 20 (10%)         | 2 (6%)                                      | 18 (11%)                                         | 0.34    |
| Culprit lesion         |                  |                                             |                                                  |         |
| LMT                    |                  |                                             |                                                  |         |
| 7 (3%)                 |                  |                                             |                                                  |         |
| LAD                    | 92 (45%)         | 16 (44%)                                    | 76 (45%)                                         | 0.93    |
| LCX                    | 38 (19%)         | 7 (19%)                                     | 31 (18%)                                         | 0.89    |
| RCA                    | 67 (33%)         | 13 (36%)                                    | 54 (32%)                                         | 0.64    |
| DES                    | 161 (79%)        | 29 (81%)                                    | 132 (79%)                                        | 0.79    |

AF indicates atrial fibrillation; PPI, proton pump inhibitor; and ACEI/ARB, angiotensin-converting enzyme inhibition/angiotensin-converting enzyme inhibition.

Table III. Medication Therapies at Discharge

|                        | Overall (n = 204) | Patients with new-onset transient AF (n = 36) | Patients without new-onset transient AF (n = 168) | P-value |
|------------------------|------------------|---------------------------------------------|--------------------------------------------------|---------|
| Aspirin                | 200 (98%)        | 33 (92%)                                    | 167 (99%)                                        | 0.002   |
| Thienopyridine         | 201 (99%)        | 34 (94%)                                    | 167 (99%)                                        | 0.025   |
| Oral anticoagulant     | 9 (4%)           | 8 (22%)                                     | 1 (1%)                                           | <0.001  |
| PPI                    | 194 (95%)        | 35 (97%)                                    | 159 (95%)                                        | 0.51    |
| Beta blocker           | 106 (52%)        | 26 (72%)                                    | 80 (48%)                                         | 0.007   |
| ACEI/ARB               | 143 (70%)        | 24 (66%)                                    | 119 (71%)                                        | 0.62    |
| Statin                 | 164 (80%)        | 27 (75%)                                    | 137 (82%)                                        | 0.36    |
| Amiodarone             | 4 (2%)           | 3 (8%)                                      | 1 (1%)                                           | 0.002   |

AF indicates atrial fibrillation; PPI, proton pump inhibitor; and ACEI/ARB, angiotensin-converting enzyme inhibition/angiotensin-converting enzyme inhibition.

Table IV. Clinical Outcomes of the Study Patients during the Follow-Up Period

|                        | Overall (n = 204) | Patients with new-onset transient AF (n = 36) | Patients without new-onset transient AF (n = 168) | P-value |
|------------------------|------------------|---------------------------------------------|--------------------------------------------------|---------|
| Death                  | 11 (5%)          | 4 (11%)                                     | 7 (4%)                                           | 0.09    |
| All strokes            | 10 (4%)          | 5 (13%)                                     | 5 (3%)                                           | 0.006   |
| Cardiogenic strokes    | 7 (3%)           | 5 (13%)                                     | 2 (1%)                                           | <0.001  |
| Follow-up period (days)| 543 ± 469        | 581 ± 491                                   | 535 ± 465                                        | 0.61    |

AF indicates atrial fibrillation.

Classification ≥ 3 and right coronary artery occlusion involving the atrial branch were independent predictors of new-onset AF. In addition, prior strokes and new-onset AF during hospitalization after AMI were potential risk factors of future cardiacogenic strokes.

AF is a common supraventricular arrhythmia after AMI and an indicator of worse prognosis in the short term and long term. Clinical atrial infarction may manifest with supraventricular arrhythmias, atrial rupture, hemodynamic compromise from loss of atrial “kick,” and thromboembolic phenomena. PR segment displacement, which means atrial infarction or damage, may predict the risk of supraventricular arrhythmias during hospitalization for AMI. However, it is difficult to evaluate these electrocardiographic changes, such as PR segment elevation, objectively in the clinical setting. Thus far, no modality can confirm atrial ischemic damage, including scintigraphy and echocardiography, after AMI, and there are few reports about atrial ischemic damage after AMI. This study indicates that a peak CK level of more than 1000 IU/L in addition to the presence of an atrial branch located distal to the culprit lesion of AMI could be considered an appropriate surrogate marker reflecting atrial ischemia.
Table V. Univariable and Multivariable Predictors of New-onset Atrial Fibrillation on Admission

| Predictors                      | Univariable analysis | Multivariable analysis |
|---------------------------------|----------------------|------------------------|
|                                | OR (95%CI)           | P-value                |
| Killip classification ≥ 3      | 8.51 (3.56-20.35)    | < 0.001                |
| Cardiac assist device          | 2.84 (0.89-9.08)     | 0.07                   |
| Peak CK ≥ 3000 (U/L)           | 1.73 (0.82-3.69)     | 0.14                   |
| EF ≤ 35 (%)                    | 3.99 (1.37-11.59)    | 0.011                  |
| Left atrial diameter ≥ 40 (mm) | 1.90 (0.81-4.43)     | 0.13                   |
| Age ≥ 65 (years)               | 1.77 (0.78-3.80)     | 0.17                   |
| eGFR ≤ 30 (mL/minute/1.73 m²)  | 2.50 (0.71-8.80)     | 0.15                   |
| Ischemic occlusion of atrial branches | 3.50 (1.66-7.35) | < 0.001                |
| Originated from RCA            | 5.14 (2.39-11.04)    | < 0.001                |

OR indicates odds ratio; CI, confidence interval; CK, creatine kinase; EF, ejection fraction; eGFR, estimated glomerular filtration rate; and RCA, right coronary artery.

Table VI. Univariable and Multivariable Predictors of Cardiogenic Stroke during the Follow-Up Period

| Predictors                      | Univariable analysis | Multivariable analysis |
|---------------------------------|----------------------|------------------------|
|                                | OR (95%CI)           | P-value                |
|                                |                      |                        |
|                                | Age                  | 1.0 (0.96-1.12)        | 0.30                   |
|                                | Male                 | 0.12 (0.024-0.64)      | 0.013                  |
|                                | Prior stroke         | 13.65 (2.95-63.50)     | 0.02                   |
|                                | CHADS2 ≥ 2           | 58.52 (0.12-28415.40)  | 0.19                   |
|                                | CHA2DS2_vasc ≥ 3     | 23.63 (0.0001-3588343) | 0.60                   |
|                                | STEMI                | 0.74 (0.16-3.35)       | 0.69                   |
|                                | Killip classification ≥ 3 | 6.74 (1.35-33.50)     | 0.02                   |
|                                | Cardiac assist device| 2.84 (0.89-9.08)       | 0.007                  |
|                                | Peak CK ≥ 3000 (IU/L)| 1.87 (0.41-8.38)       | 0.41                   |
|                                | EF ≤ 35 (%)          | 1.63 (0.18-14.52)      | 0.65                   |
|                                | Left atrial diameter ≥ 40 (mm) | 1.11 (0.17-7.17)     | 0.91                   |
|                                | Culprit LAD          | 1.81 (0.41-8.60)       | 0.41                   |
|                                | Culprit LCX          | 1.45 (0.28-7.53)       | 0.65                   |
|                                | Culprit RCA          | 0.31 (0.037-2.63)      | 0.18                   |
|                                | Oral anti-coagulant  | 5.98 (0.67-53.09)      | < 0.001                |
|                                | Beta blocker         | 0.70 (0.15-3.13)       | 0.64                   |
|                                | Amiodarone           | 13.6 (1.59-117.22)     | 0.017                  |
|                                | Ischemic occlusion of atrial branches | 5.05 (0.97-26.19) | 0.054                  |
|                                | Originated from RCA  | 4.33 (0.96-19.36)      | 0.055                  |
|                                | New-onset AF         | 10.28 (1.98-53.35)     | 0.006                  |

HR indicates hazard ratio; CI, confidence interval; STEMI, ST-segment elevation myocardial infarction; CK, creatine kinase; EF, ejection fraction; LAD, left anterior descending artery; LCX, left circumflex artery; RCA, right coronary artery; AF, Atrial fibrillation.

Table VII. Details of All Seven Patients with Cardiogenic Stroke during the Follow-Up Period

| Case | Age | Gender | New-onset AF | CHADS2 score | CHA2DS2 score | Atrial ischemic damage | Prior stroke | Anti-coagulant at discharge | Anti-coagulant at the time of stroke | Antiplatelet therapy at the time of stroke | EF (%) | Type of stroke | Days from AMI to stroke onset (days) |
|------|-----|--------|--------------|--------------|--------------|------------------------|--------------|-----------------------------|---------------------------------------|----------------------------------------|--------|----------------|-------------------------------|
| 1    | 75  | M      | ×            | 4            | 6            | ×                      | ○            | ×                           | ×                                     | NA                                    | 44     | Silent multiple Infarction (right MCA) | 471                           |
| 2    | 79  | F      | ×            | 3            | 6            | ×                      | ×            | ×                           | ×                                     | NA                                    | 39     | Infarction                  | 146                           |
| 3    | 86  | M      | ×            | 5            | 8            | ×                      | ×            | ×                           | ×                                     | Dual                                  | 40     | Infarction                  | 75                            |
| 4    | 64  | F      | ×            | 5            | 7            | ×                      | ×            | ×                           | ×                                     | Dual                                  | 50     | Infarction                  | 510                           |
| 5    | 51  | F      | ×            | 3            | 5            | ×                      | ×            | ×                           | ×                                     | Dual                                  | 25     | Infarction                  | 80                            |
| 6    | 82  | F      | ×            | 2            | 5            | ×                      | ×            | ×                           | ×                                     | Dual                                  | 80     | Silent multiple Infarction | 884                           |
| 7    | 76  | M      | ×            | 2            | 4            | ×                      | ×            | ×                           | ×                                     | Dual                                  | 50     | Infarction                  | 9                             |

AF indicates atrial fibrillation; EF, ejection fraction; AMI, acute myocardial infarction; M, male; F, female; and MCA, middle cerebral artery.

Atrial ischemic damage and new-onset AF: AF mechanisms involve complex factors, such as genetic components, heart failure, atrial stretch and ischemia, sympathetic influences, inflammation, and fibrosis. A system-
atic review showed that advanced age, heart failure symptoms, and depressed left ventricular function are potential predictors of AF in the AMI setting. Selective atrial artery occlusion during elective percutaneous transluminal coronary angioplasty, not in the AMI setting, is associated with myocardial ischemic damage and atrial arrhythmias. In the AMI setting, some reports have demonstrated that sinus node artery and atrial branches affected AF development. These reports, however, did not consider the relationship between atrial ischemic damages and other factors of AF, including advanced age, heart failure symptoms, and depressed left ventricular function. Therefore, it was not clearly determined how much atrial ischemic damage affects the development of new-onset AF in AMI.

Atrial and supraventricular tachycardia were recorded more frequently after inferior wall MI in patients with right ventricular involvement than in those without right ventricular involvement. Although the right coronary artery as the culprit lesion of AMI was less frequent in patients with new-onset AF compared to those without new-onset AF in the present study, atrial ischemic damage originating from the right coronary artery was associated with new-onset AF. Atrial ischemia and infarction results in atrial electrophysiological changes and the propensity for AF, forming the dominant substrate for AF in MI. It was notable that atrial ischemia originating from the right coronary artery was a stronger AF risk factor than that originating from the left circumflex artery in this study. According to these data, a strategy that protects atrial branches from the right coronary artery may be effective for preventing new-onset AF after percutaneous coronary intervention.

New-onset AF and stroke events: AF is associated with an increased risk of mortality in AMI, and new-onset AF, as well as persistent AF, is associated with major adverse cardiovascular events in patients with AMI. This study demonstrated that new-onset AF during hospitalization was strongly associated with stroke and cardio- genic stroke events. The clinical implication of this study is that strict, continuous follow-up of atrial arrhythmias is necessary for patients with new-onset AF in the acute phase after AMI for the purpose of preventing future stroke. Furthermore, appropriate anticoagulant therapy should be considered to improve the clinical outcomes in this population.

Limitations: First, this study had a retrospective design and a relatively small sample size in a single center. Second, we assumed that a peak CK level of more than 1000 IU/L in addition to the presence of an atrial branch located distal to the culprit lesion of AMI reflected atrial ischemia; however, atrial ischemia was not directly evaluated by myocardial imaging in this study. Lastly, there is a possibility that patients already developed asymptomatic AF before AMI because asymptomatic AF is undiagnosed by the conventional method.

Conclusions

Proximal occlusion in the right coronary artery involving the atrial branch is a strong predictor of new-onset AF after AMI. Additionally, strict follow-up of AF may be necessary for patients with new-onset AF, as they are at a high risk for future stroke.

Disclosure

Conflicts of interest: The authors declare that there is no conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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