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ORIGINAL ARTICLE

Comparison of mid-term clinical outcomes after acute myocardial infarction in diabetic men between living alone and living together

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Abstract

Because living alone is associated with an increased risk of type 2 diabetes mellitus in men but not women, living alone may be a risk factor of cardiovascular events after acute myocardial infarction (AMI) in diabetic men. The aim of the present study was to investigate the association between living alone and mid-term clinical outcomes after AMI in diabetic men. We conducted a single center, retrospecitve study. The primary endpoint was the major adverse cardiovascular events (MACE) defined as the composite of all cause death, AMI, and target vessel revascularization. A total of 253 AMI men with diabetes mellitus were included from our hospital records, and divided into the living together group ($n=203$) and the living alone group ($n=50$). Median follow-up duration was 239 days (Q1: 94 days, Q3: 451 days). A total of 66 MACE was observed during the study period, and Kaplan–Meier curves were constructed to compare the MACE. The MACE was more frequently observed in the living alone group than the living together group ($P=0.041$). Multivariate Cox regression analysis revealed that the living alone group was significantly associated with the MACE (Odds ratio: 1.770, 95% confidence interval 1.018–3.077, $P=0.043$) after known clinical risk factors. In conclusion, living alone was significantly associated with the mid-term MACE after AMI in diabetic men. It may be important to provide multiple interventions including lifestyle guidance as well as sufficient acute medical care for such high-risk patients.

Keywords Acute myocardial infarction · Diabetes mellitus · MACE

Introduction

As compared to patients living together, the greater risk of cardiovascular events after acute myocardial infarction (AMI) has been reported in patients living alone [1–4]. Although a greater psycological stress such as depression or poorer nutritional status in patients living alone may be associated with subsequent cardiovascular events after AMI [4, 5], the clear reasons why patients living alone have the greater risk after AMI have not been explained from those studies. Furthermore, Nakatsuma et al. reported that living alone was not associated with higher long-term mortality in patients with AMI who underwent percutaneous coronary interventions (PCI) [6]. Therefore, living alone may not be a risk factor in the general population, but may be a risk factor in the specific population such as patients with diabetes mellitus. Because living alone is associated with an increased risk of type 2 diabetes mellitus in men but not women [7], living alone may be a risk factor of cardiovascular events after AMI in diabetic men. The aim of the present study was to investigate the association between living alone and mid-term clinical outcomes after AMI in diabetic men.

Methods

Study design

We conducted a single center retrospective study. We identified AMI patients from hospital records in our medical center from January 2015 to December 2017. The diagnosis

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of AMI required the following criteria: symptoms consistent with AMI, elevated cardiac enzymes including Troponin T, Troponin I, and/or creatinine kinase (at least two-fold increase from the normal upper limit), and ST-segment elevation or depression in electrocardiograms compatible with AMI [8, 9]. We identified diabetes mellitus as hemoglobin A1c level > 6.5% (as NGSP value) or treatment for diabetes mellitus [10]. We confirmed the presence of family who live together with patients from hospital records. The exclusion criteria were (1) female sex (2) non-diabetic mellitus, and (3) second or more than second AMI during the study period. The study population was divided into the group that has family living together (the living together group) and the group that does not have family living together (the living alone group). The primary endpoint was the major adverse cardiovascular events (MACE) defined as the composite of all cause death, AMI, and target vessel revascularization (TVR). In-hospital and mid-term clinical outcomes were acquired from hospital records. The day of admission was defined as the index day (day 1). Patients were followed until meeting the MACE or until the study end date (June 2018). This study was approved by the institutional review board and written informed consent was waived because of the retrospective study design. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Definitions

Hypertension was defined as either the use of antihypertensive treatment, systolic blood pressure > 140 mmHg, or diastolic blood pressure > 90 mmHg [10, 11]. Dyslipidemia was defined as total cholesterol level > 220 mg/dL or low-density lipoprotein cholesterol level > 140 mg/dL or medical treatment for dyslipidemia [10]. We also calculated estimated glomerular rate (eGFR) from the serum creatinine level, age, weight, and gender using the following formula: $eGFR = 194 \times Cr^{1.094} \times age - 0.287$ (male). Chronic kidney disease was defined as eGFR < 60 ml/min/1.73m^2. Diagnostic ST elevation was defined as new ST elevation at the J point in at least 2 contiguous leads of 2 mm (0.2 mV) and others were defined as non-ST elevation [12]. Shock was defined as systolic blood pressure < 90 mmHg. Ejection fraction was measured either a modified Simpson method, a Teichholz method, or eyeball estimation. Ejection fraction measured by a Teicholz method was adopted only when a modified Simpson method was not available. Eyeball estimation of ejection fraction was adopted only when both a modified Simpson method and a Teicholz method were not available. We also investigated the independence of activity of daily living using the following 6 parameters: having meals, using the toilet (bathroom), maintaining cleanliness, washing face, changing clothes, and moving around. Significant stenosis was defined as 50% stenosis of left main coronary artery, 75% stenosis of right coronary artery, left coronary descending anterior descending branch, and circumflex branches. Chronic total occlusion was defined as total occlusion with complete interruption of antegrade blood flow as assessed by coronary arteriography and with an estimated duration of occlusion of ≥ 3 months [13]. The Global Registry of Acute Coronary Events (GRACE) risk score was also calculated [14].

Statistical analysis

Data are expressed as mean ± standard deviation or percentage. Normally distributed continuous variables were compared between the groups using an unpaired Student's *t* test. Otherwise, continuous variables were compared using a Mann–Whitney *U* test. Categorical variables were compared using a Chi-square test. Event free survival curves were constructed using the Kaplan–Meier method, and statistical differences between curves were assessed by the log lank test. *P* value < 0.05 was considered statistically significant. We also performed a multivariate Cox regression analysis to investigate the association between living alone and MACE after controlling known clinical confounders such as the GRACE risk score [14], hemoglobin A1c levels [15], triple vessel disease [16], and final TIMI-3 flow grade [9, 17]. Hazard ratios (HRs) and the 95% confidence intervals (CI) were calculated. All analyses were performed using statistical software, SPSS 18.0/Windows (SPSS, Chicago IL, USA).

Results

From January 2015 to December 2017, a total of 789 AMI patients were admitted to division of cardiovascular medicine, Saitama Medical Center, Jichi Medical University. After excluding 536 patients who were compatible with exclusion criteria, a total of 253 AMI men with diabetes mellitus were included as the final study population, and divided into the living together group ($n = 203$) and the living alone group ($n = 50$) (Fig. 1).

Table 1 shows the comparison of clinical characteristics between the 2 groups. Most of clinical characteristics were comparable except the prevalence of hemodialysis and previous PCI, and diastolic blood pressure at admission. Table 2 shows the comparison of lesion and procedural characteristics between the 2 groups. The lesion and procedural characteristic were not different between the 2 groups.

Kaplan–Meier curves were constructed to compare the MACE, all cause death, AMI, and TVR between the 2 groups (Fig. 2). Median follow-up duration was 239 days (Q1: 94 days, Q3: 451 days). A total of 66 MACE was observed during the follow-up duration. The MACE was more frequently observed in the living alone group than the living

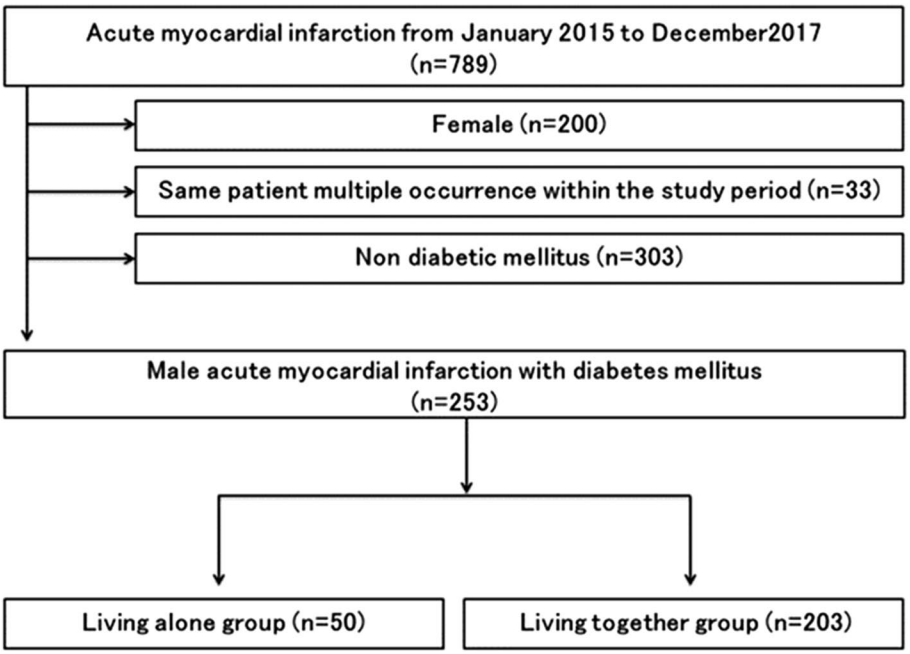

Fig. 1 Study flowchart

together group ($P=0.041$) (Fig. 2a). While the incidence of all cause death and AMI was not different between the groups, TVR was more frequently observed in the living alone group than in the living together group ($P=0.027$) (Fig. 2d). We also investigated the MACE, all cause death, AMI, and TVR between the living alone and the living together in men without diabetes, in women with diabetes, and in women without diabetes. The MACE, all cause death, AMI, or TVR was not significantly different between the living alone and the living together in men without diabetes (Supplemental Fig. 1), in women with diabetes (Supplemental Fig. 2), and in women without diabetes (Supplemental Fig. 3).

Multivariate Cox regression analysis was performed in Table 3. The living alone group was significantly associated with MACE (OR 1.770, 95% CI 1.018–3.077, $P=0.043$) after controlling the GRACE risk score, hemoglobin A1c levels, triple vessel disease, and final TIMI-3 flow grade. Furthermore, we performed another analysis in which the day of discharge was defined as the index day (Supplemental Fig. 4). This analysis only included the post discharge events. The MACE was more frequently observed in the living alone group than the living together group ($P<0.001$) (Supplemental Fig. 4A). The number of each clinical events are shown in Table 4.

Discussion

The present study included 253 AMI men with diabetes mellitus, which were divided into the living together group ($n=203$) and the living alone group ($n=50$). A total of 66 MACE was observed in the median follow-up duration of 239 days. The mid-term MACE was more frequently observed in the living alone group than the living together group ($P=0.041$). Furthermore, the living alone group was significantly associated with the MACE (OR 1.770, 95% CI 1.018–3.077, $P=0.043$) even after controlling known clinical risk factors. Our results suggest the greater cardiovascular risk after AMI in diabetic men who live alone.

Although several groups investigated the association between living alone and cardiovascular risks after AMI [1–6], there was no study that focused on diabetic men. Since the cardiovascular mortality is greater in patients with diabetes than patients without diabetes and the prevalence of diabetes keep increasing in developing countries as well as developed countries [18–20], we selected patients with diabetes mellitus as our study population. Furthermore, because there were significant sex differences in the occurrence of major clinical events in patients with diabetes mellitus [21], we focused on diabetic men. Although the diet therapy is a cornerstone for diabetes mellitus [22, 23], diabetic men who live alone may have difficulty to cook appropriate diet for themselves or to access the properly prepared diet. Moreover, living alone was the strong predictor of mortality among diabetic men, while living alone did not increase the mortality in diabetic women [24]. Therefore, we hypothesized that diabetic men who live alone would have worse clinical outcomes.

We should discuss why the MACE was more frequently observed in the living alone group than the living together group. Kuhl et al. reported that living alone was associated with anxiety at 4 months after AMI [25], and such anxiety

Table 1 The comparison of baseline patient characteristics between the living alone group and the living together group

	All ($n=253$)	Living alone group ($n=50$)	Living together group ($n=203$)	P value
Age, years (n)	69.1 ± 12.0	67.5 ± 11.9	69.5 ± 12.0	0.187
Body mass index (kg/m^2)	24.6 ± 3.7 ($n=251$)	25.0 ± 4.3 ($n=49$)	24.5 ± 3.5 ($n=202$)	0.455
H7ypertension, n (%)	206 (81.4)	40 (80.0)	166 (81.8)	0.721
Dyslipidemia, n (%)	169 (66.8)	33 (66.0)	136 (67.0)	0.823
Chronic kidney disease, n (%)	114 (45.1)	24 (48.0)	90 (44.3)	0.641
Hemodialysis, n (%)	28 (11.1)	10 (20.0)	18 (8.9)	0.025
Current smoker, n (%)	94 (37.2)	17 (34.0)	77 (37.9)	0.557
Previous PCI, n (%)	70 (27.7)	20 (40.0)	50 (24.6)	0.030
Previous CABG, n (%)	15 (5.9)	2 (4.0)	13 (6.4)	0.742
Previous myocardial infarction, n (%)	55 (21.7)	14 (28.0)	41 (20.2)	0.231
Killip 1 or 2, n (%)	186 (73.5)	36 (72.0)	150 (73.9)	0.786
Shock, n (%)	35 (13.8)	11 (22.0)	24 (11.8)	0.062
Cardio pulmonary arrest, n (%)	18 (7.1)	6 (12.0)	12 (5.9)	0.135
STEMI or NSTEMI				0.969
STEMI, n (%)	136 (53.8)	27 (54.0)	109 (53.7)	
NSTEMI, n (%)	117 (46.2)	23 (46.0)	94 (46.3)	
Systolic blood pressure at admission (mmHg)	138.1 ± 36.0	145.1 ± 43.2	136.5 ± 33.9	0.102
Diastolic blood pressure at admission (mmHg)	77.8 ± 22.9	84.2 ± 28.1	76.3 ± 21.2	0.022
Heart rate (bpm)	82.7 ± 24.0	86.0 ± 25.4	81.9 ± 23.7	0.225
Total cholesterol (mg/dl)	170.1 ± 50.0 ($n=248$)	178.6 ± 52.0 ($n=48$)	168.0 ± 49.4 ($n=200$)	0.111
Triglycerides (mg/dl)	153.9 ± 244.5 ($n=249$)	157.6 ± 121.1 ($n=49$)	153.0 ± 266.4 ($n=200$)	0.234
White blood cell (/μL)	9115.2 ± 3534.2	9981.4 ± 3769.0	8901.9 ± 3450.3	0.057
Hemoglobin (g/dL)	13.1 ± 2.2	13.4 ± 2.2	13.1 ± 2.2	0.467
C reactive protein (mg/dL)	2.6 ± 5.3	2.6 ± 5.9	2.6 ± 5.2	0.683
Serum creatinine (mg/dl)	1.9 ± 2.5	2.6 ± 3.2	1.7 ± 2.2	0.367
eGFR (ml/min/1.73m^2)	58.2 ± 30.6	56.0 ± 34.8	58.7 ± 29.5	0.594
Peak CK (IU/l)	1640.1 ± 3097.2	2458.4 ± 5090.3	1438.5 ± 2339.8	0.132
Peak CK-MB (IU/l)	124.9 ± 185.4	160.1 ± 238.6	116.2 ± 169.5	0.326
HbA1c (%)	7.4 ± 1.5 ($n=248$)	7.6 ± 2.0 ($n=48$)	7.4 ± 1.4 ($n=200$)	0.467
Brain natriuretic peptide (pg/ml)	474.0 ± 850.0 ($n=244$)	555.9 ± 878.7	452.9 ± 843.4 ($n=194$)	0.718
Ejection fraction (%)	50.2 ± 14.1 ($n=252$)	48.9 ± 14.6	50.6 ± 14.1 ($n=202$)	0.441
Catecholamine use, n (%)	42 (16.6)	10 (20.0)	32 (15.8)	0.480
IABP support, n (%)	47 (18.6)	11 (22.0)	36 (17.7)	0.487
PCPS support, n (%)	18 (7.1)	3 (6.0)	15 (7.4)	1.0
GRACE risk score	138.0 ± 39.6	138.1 ± 41.1	138.0 ± 39.3	0.885
Medication at admission				
Aspirin, n (%)	100 (39.5)	21 (42.0)	79 (38.9)	0.690
Statin, n (%)	112 (44.3)	22 (44.0)	90 (44.3)	0.966
ACE inhibitor or ARB, n (%)	114 (45.1)	20 (40.0)	94 (46.3)	0.422
Beta blocker, n (%)	77 (30.4)	17 (34.0)	60 (29.6)	0.541
Calcium channel blocker, n (%)	107 (42.3)	18 (36.0)	89 (43.8)	0.315
Nitrate, n (%)	36 (14.2)	4 (8.0)	32 (15.8)	0.159
Oral hypoglycemic agent, n (%)	148 (58.5)	27 (54.0)	121 (59.6)	0.471
Insulin, n (%)	41 (16.2)	5 (10.0)	36 (17.7)	0.184
Independence of activity of daily living				
Having meals	249 (98.4)	49 (98.0)	200 (98.5)	0.791
Using the toilet	242 (95.7)	46 (92.0)	196 (96.6)	0.158
Maintaining cleanliness	235 (92.9)	44 (88.0)	191 (94.1)	0.134
Washing face	242 (95.7)	46 (92.0)	196 (96.6)	0.158
Changing clothes	234 (92.5)	46 (92.0)	188 (92.6)	0.884
Moving around	236 (93.3)	47 (94.0)	189 (93.1)	0.821

Data were expressed as mean ± SD or numbers (percentages). A Student's t test was used for normally distributed continuous variables, and Mann–Whitney U test was used for abnormally distributed continuous variables. A Chi-square test was used for categorical variables

Table 1 (continued)

PCI percutaneous coronary intervention, *CABG* coronary artery bypass grafting, *STEMI* ST-elevation myocardial infarction, *NSTEMI* non ST-elevation myocardial infarction, *CK* creatine kinase, IABP intra-aortic balloon pumping, *PCPS* percutaneous cardio–pulmonary support, *GRACE* risk score Global Registry of Acute Coronary Events, *ACE* angiotensin converting enzyme, *ARB* angiotensin II receptor blocker

was closely associated with lower adherence to many important risk-reducing recommendations such as smoking cessation or increasing socialization after MI [25]. Since living alone was significantly associated with fear of hypoglycemia in insulin-treated patients with type 2 diabetes mellitus [26], insulin-treated patients in the living alone group might have a tendency to overeat, which could deteriorate lipid and glycemic profiles. Although the independence of activity of daily living was not different between the living alone and together groups, elderly patients living alone might have shopping difficulty, which resulted in poor food accessibility [27]. Furthermore, although we did not investigate the socioeconomic status such as income levels or environmental factors, diabetic men who live alone might be suffered from low socioeconomic status, which are closely associated with the greater cardiovascular risk [28]. Another possibility was that the combination of male sex and living alone may be an independent risk factor. Heianza, et al. reported that living alone was associated with undiagnosed diabetes in men [29], which may suggest the combination of male sex and living alone as an independent risk. Overall, the living alone group might tend to be low adherence to risk-reducing recommendations after MI.

Clinical implications of the present study should be noted. First, if we can recognize living alone as a risk factor in diabetic men after AMI, more medical resources should be focused on how to prevent future cardiovascular events. It would be important to provide lifestyle guidance such as diet management as well as sufficient acute medical care including primary PCI. Second, psychological support may be needed to relieve anxiety even for patients who had not recognize anxiety before AMI. Third, it may be necessary to collaborate with home-visit nursing station especially for elderly men. Fourth, living alone is one of multiple factors representing socioeconomic status. Our results suggest the importance of future investigation regarding socioeconomic status in the field of cardiovascular outcomes [28].

Study limitations

We should mention several study limitations. First, since this study was a single-center, retrospective observational study, there is a risk of selection bias. However, it would be difficult to conduct a prospective randomized study whether living alone or together. Second, the mid-term MACE might reflect baseline severity such as hemodialysis rather than management after discharge. Therefore, the longer follow-up would be needed to elucidate our hypothesis that living alone is a risk factor of cardiovascular events after AMI in diabetic men. Third, we could not conduct power analysis to define appropriate sample size, because our hypothesis was not investigated in earlier literatures. Although we showed the significant association between the mid-term MACE and living alone, the association between the hard endpoint (all-cause death or AMI) and living alone was not significant. This discrepancy may be derived from the small sample size for such specific endpoints. Fourth, we defined diabetes mellitus based on only hemoglobin A1c levels and current diabetic medications, which might miss diabetic patients that were balanced with an appropriate diet. Finally, although we constructed a multivariate Cox regression analysis to confirm the association between the mid-term MACE and living alone, we could not enter all clinical variables. Since the number of MACE was 66 and the number of events per variable should be less than 10 [30, 31], we selected the following 5 independent variables (living alone, the GRACE score [14], hemoglobin A1c levels [15], triple vessel disease [16], and final TIMI-3 flow grade [9, 17]).

Conclusion

Living alone was significantly associated with the mid-term MACE after AMI in diabetic men. It may be important to provide multiple interventions including lifestyle guidance as well as sufficient acute medical care including primary PCI for such high-risk patients.

Table 2 The comparison of lesion and procedural characteristics between the living alone group and the living together group

	All ($n=253$)	Living alone group ($n=50$)	Living together group ($n=203$)	
Angiographic lesion characteristics				
Coronary angiography, *n* (%)	251 (99.2)	50 (100)	201 (99.0)	0.481
Infract-related artery, *n* (%)				0.057
LM-LAD, *n* (%)	121 (48.2) ($n=251$)	19 (38.0)	102 (50.7) ($n=201$)	
Left circumflex artery, *n* (%)	44 (17.5) ($n=251$)	7 (14.0)	37 (18.4) ($n=201$)	
Right coronary artery, *n* (%)	71 (28.3) ($n=251$)	21 (42.0)	50 (24.9) ($n=201$)	
Graft of CABG, *n* (%)	3 (1.2) ($n=251$)	0 (0)	3 (1.5) ($n=201$)	
Not determined, *n* (%)	12 (4.8) ($n=251$)	3 (6.0)	9 (4.5) ($n=201$)	
Number of narrowed coronary arteries				0.819
1 vessel, *n* (%)	88 (35.1) ($n=251$)	18 (36.0)	70 (34.8) ($n=201$)	
2 vessels, *n* (%)	79 (31.5) ($n=251$)	16 (32.0)	63 (31.3) ($n=201$)	
3 vessels, *n* (%)	84 (33.5) ($n=251$)	16 (32.0)	68 (33.8) ($n=201$)	
Chronic total occlusion in other vessels, *n* (%)	63 (25.1) ($n=251$)	8 (16.0)	55 (27.4) ($n=201$)	0.097
Ostial lesion, *n* (%)	54 (21.5) ($n=251$)	8 (16.0)	46 (22.9) ($n=201$)	0.289
Bifurcation lesion, *n* (%)	116 (46.2) ($n=251$)	23 (46.0)	93 (46.3) ($n=201$)	0.973
Thrombus identified angiography, *n* (%)	79 (31.5) ($n=251$)	18 (36.0)	61 (30.3) ($n=201$)	0.441
Aspiration, *n* (%)	42 (16.7) ($n=251$)	9 (18.0)	33 (16.4) ($n=201$)	0.789
Initial TIMI flow grade				0.712
0, *n* (%)	98 (39.0) ($n=251$)	21 (42.0)	77 (38.3) ($n=201$)	
1, *n* (%)	38 (15.1) ($n=251$)	7 (14.0)	31 (15.4) ($n=201$)	
2, *n* (%)	27 (10.8) ($n=251$)	5 (10.0)	22 (10.9) ($n=201$)	
3, *n* (%)	88 (35.1) ($n=251$)	17 (34.0)	71 (35.3) ($n=201$)	
Final TIMI flow grade				0.638
0, *n* (%)	0 (0) ($n=224$)	0 (0) ($n=43$)	0 (0) ($n=181$)	
1, *n* (%)	0 (0) ($n=224$)	0 (0) ($n=43$)	0 (0) ($n=181$)	
2, *n* (%)	17 (7.6) ($n=224$)	4 (9.3) ($n=43$)	13 (7.2) ($n=181$)	
3, *n* (%)	207 (92.4) ($n=224$)	39 (90.7) ($n=43$)	168 (92.8) ($n=181$)	
Treatment				0.392
Medication, *n* (%)	17 (6.8) ($n=251$)	5 (10.0)	12 (6.0) ($n=201$)	
Coronary artery bypass graft, *n* (%)	10 (4.0) ($n=251$)	2 (4.0)	8 (4.0) ($n=201$)	
Percutaneous coronary intervention, *n* (%)	224 (89.2) ($n=251$)	43 (86.0)	181 (90.0) ($n=201$)	
Final procedure				0.548
Plain old balloon atherectomy, *n* (%)	10 (4.5) ($n=224$)	3 (7.0) ($n=43$)	7 (3.9) ($n=181$)	
Drug coated balloon, *n* (%)	7 (3.1) ($n=224$)	2 (4.7) ($n=43$)	5 (2.8) ($n=181$)	
Bare metal stent, *n* (%)	9 (4.0) ($n=224$)	1 (2.3) ($n=43$)	8 (4.4) ($n=181$)	
Drug eluting stent, *n* (%)	198 (88.4) ($n=224$)	37 (86.0) ($n=43$)	161 (89.0) ($n=181$)	
Stent size				
Mean stent diameter (mm)	2.80 ± 0.36 ($n=207$)	2.79 ± 0.33 ($n=38$)	2.80 ± 0.37 ($n=169$)	0.957
Stent length (mm)	29.1 ± 14.3 ($n=207$)	29.3 ± 14.7 ($n=38$)	29.1 ± 14.2 ($n=169$)	0.666
Access site				0.807
Radial artery, *n* (%)	128 (57.1) ($n=224$)	24 (55.8) ($n=43$)	104 (57.5) ($n=181$)	
Brachial artery, *n* (%)	10 (4.5) ($n=224$)	5 (11.6) ($n=43$)	5 (2.8) ($n=181$)	
Femoral artery, *n* (%)	86 (38.4) ($n=224$)	14 (32.6) ($n=43$)	72 (39.8) ($n=181$)	
Catheter size				0.722
6Fr, *n* (%)	120 (53.6) ($n=224$)	24 (55.8) ($n=43$)	96 (53.0) ($n=181$)	
7Fr, *n* (%)	103 (46.0) ($n=224$)	19 (44.2) ($n=43$)	84 (46.4) ($n=181$)	
8Fr, *n* (%)	1 (0.4) ($n=224$)	0 (0) ($n=43$)	1 (0.6) ($n=181$)	

Data were expressed as mean ± SD or numbers (percentages). A Student's *t* test was used for normally distributed continuous variables, and Mann–Whitney *U* test was used for abnormally distributed continuous variables. A Chi-square test was used for categorical variables

CABG coronary artery bypass grafting, *TIMI* thrombolysis in myocardial infarction

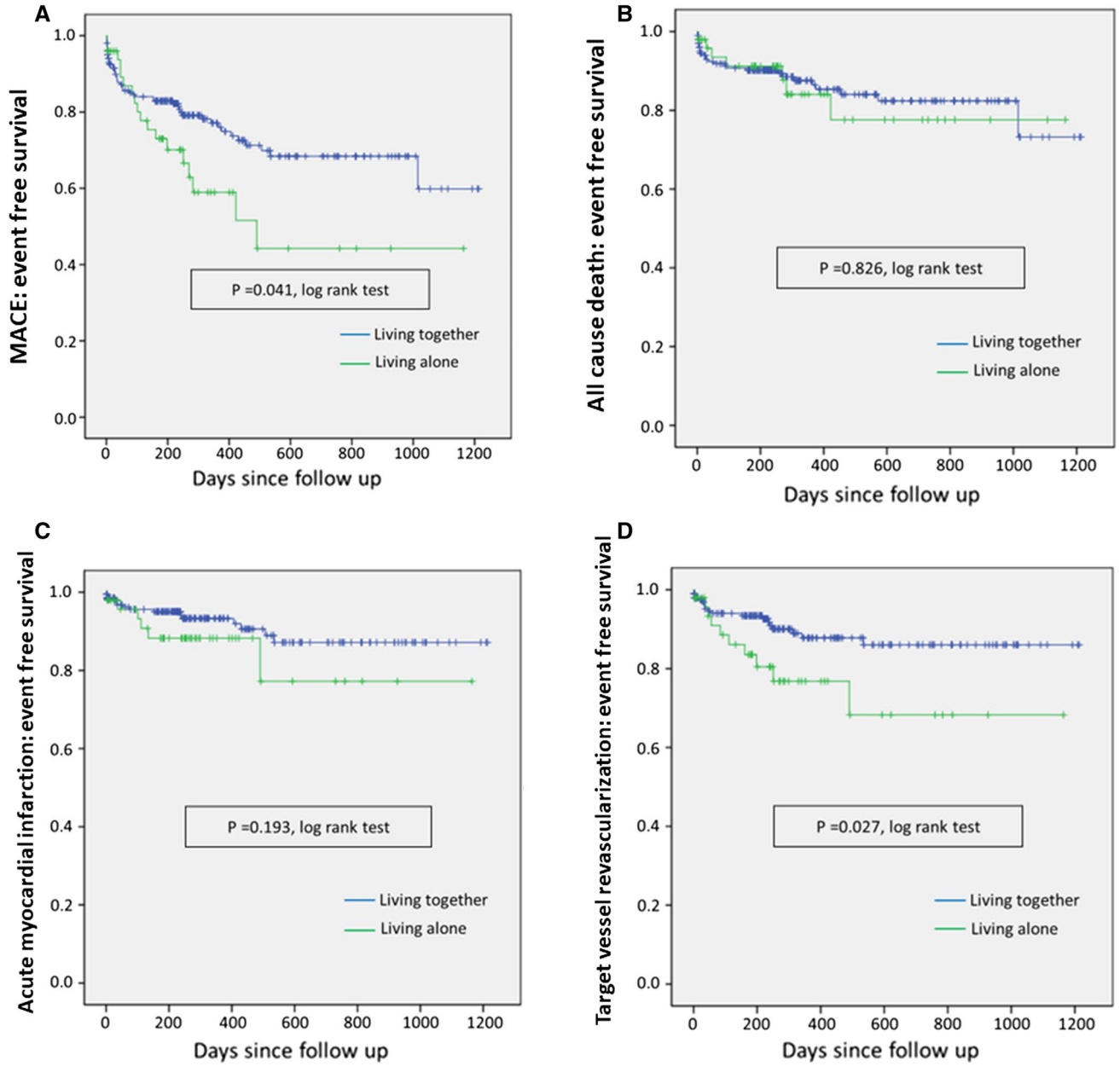

Fig. 2 Kaplan–Meier curves for MACE, all cause death, acute myocardial infarction, target vessel revascularization between the living alone group and the living together group. **a** The MACE free survival is shown between the living alone and living together groups. The difference was significant between the groups ($P=0.041$). *MACE* major adverse cardiovascular event. **b** All cause death free survival is shown between the living alone and living together groups. The difference was not significant between the groups ($P=0.826$). **c** Acute myocardial infarction free survival is shown between the living alone and living together groups. The difference was not significant between the groups ($P=0.193$). **d** Target vessel revascularization free survival is shown between the living alone and living together groups. The difference was significant between the groups ($P=0.027$)

Table 3 Multivariate Cox regression analysis to predict the MACE

Independent variables	Dependent variable: MACE		
	Hazard ratios	95% confidence interval	*P* value
Living alone (vs. living together)	1.770	1.018–3.077	0.043
GRACE risk score	1.019	1.012–1.026	< 0.001
Hemoglobin A1c (1% increase)	1.067	0.882–1.289	0.505
Triple vessel disease (vs. 1 or 2 vessel disease)	1.531	0.920–2.550	0.101
Final TIMI 3 flow (vs. Final TIMI ≤ 2 flow)	0.605	0.293–1.248	0.174

Table 4 Clinical outcomes between the living alone group and the living together group

All events including in–hospital events	All ($n=253$)	Living alone group ($n=50$)	Living together group ($n=203$)	*P* value
MACE, *n* (%)	66 (26.1)	18 (36.0)	48 (23.6)	0.075
All cause of death, *n* (%)	34 (13.4)	7 (14.0)	27 (13.3)	0.897
Acute myocardial infarction, *n* (%)	21 (8.3)	6 (12.0)	15 (7.4)	0.267
Target vessel revascularization, *n* (%)	29 (11.5)	10 (20.0)	19 (9.4)	0.034
Post discharge events	All ($n=219$)	Living alone group ($n=44$)	Living together group ($n=175$)	*P* value
MACE, *n* (%)	46 (21.0)	17 (38.6)	29 (16.6)	0.001
All cause of death, *n* (%)	18 (8.2)	6 (13.6)	12 (6.9)	0.214
Acute myocardial infarction, *n* (%)	17 (7.8)	5 (11.4)	12 (6.9)	0.345
Target vessel revascularization, *n* (%)	24 (11.0)	9 (20.5)	15 (8.6)	0.032

A Chi-square test was used for categorical variables

In the analysis of post discharge events, patients who died in the index admission ($n=16$) and patients who did not have any follow-up visits ($n=18$) were excluded

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