

Immediate Percutaneous Coronary Intervention Is Associated With Improved Short- and Long-Term Survival After Out-of-Hospital Cardiac Arrest

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Background—Whether to perform or not an immediate percutaneous coronary intervention (PCI) after out-of-hospital cardiac arrest is still debated. We aimed to evaluate the impact of PCI on short- and long-term survival in out-of-hospital cardiac arrest patients admitted after successful resuscitation.

Methods and Results—Between 2000 and 2013, all nontrauma out-of-hospital cardiac arrest patients admitted in a Parisian cardiac arrest center after return of spontaneous circulation were prospectively included. The association between immediate PCI and short- and long-term mortality was analyzed using logistic regression and Cox multivariate analysis, respectively. Propensity score-matching method was used to assess the influence of PCI on short- and long-term survival. During the study period, 1722 patients (71.5% male, median age 60 [49.6, 72.2] years) were analyzed: 628 (35.6%) without coronary angiography, 615 (35.7%) with coronary angiography without PCI, and 479 (27.8%) with both. Among these groups, day 30 and year-10 survival rates were 21% and 11.9%, 35% and 29%, 43% and 38%, respectively ($P<0.01$ for each). PCI as compared with no coronary angiography was associated with a lower day-30 and long-term mortality (adjOR_{coro with PCI versus no coro} 0.71, 95% confidence interval [0.54, 0.92]; $P=0.02$ and adjHR_{coro with PCI versus no coro} 0.44, 95% confidence interval [0.27, 0.71]; $P<0.01$, respectively). PCI remained associated with a lower risk of long-term mortality (adjHR 0.29; 95% confidence interval [0.14, 0.61]; $P<0.01$) in propensity score-matching analysis.

Conclusions—Immediate PCI after out-of-hospital cardiac arrest was associated with significant reduced risk of short- and long-term mortality. These findings should suggest physicians to consider immediate coronary angiography and PCI if indicated in these patients. (*Circ Cardiovasc Interv.* 2015;8:e002303. DOI: 10.1161/CIRCINTERVENTIONS.114.002303.)

Key Words: cardiac arrest ■ coronary angiography ■ long-term outcome ■ percutaneous coronary intervention ■ therapeutic hypothermia

The high prevalence of recent coronary occlusion provides a strong rationale for performing a systematic coronary angiography in out-of-hospital cardiac arrest (OHCA) patients with no obvious extracardiac cause to detect the culprit lesion. Early coronary angiography also enables immediate percutaneous intervention (PCI), when indicated. Since the publication of the pioneering study by Spaulding and coworkers in 1997,¹ many observational studies have reported the feasibility and possible survival benefit from an early invasive approach.^{2–4} In the largest study, successful immediate PCI was found to be an independent factor for short-term survival, regardless of the post-resuscitation ECG findings.⁵ On the opposite, several studies found no benefit in using such an

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interventional strategy and proposed to restrict its use to highly selected patients.⁶ There is therefore still an ongoing debate on the use of an early invasive strategy in all survivors of OHCA with no obvious noncardiac cause of arrest. As previous studies focused on selected subgroups⁷ or restricted their analysis to hospital discharge survivors,⁸ long-term outcome assessed in less selected population could be useful to improve decision algorithms, as recommended by a recent statement.⁹

To further investigate the prognostic role of early PCI, we studied its impact on short- and long-term mortality in a large, real-life registry using a large cohort of OHCA survivors.

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WHAT IS KNOWN

- Although short-term outcome of out-of-hospital cardiac arrest patients is nowadays well described, data on long-term follow up of such patients remain scarce.
- Successful percutaneous coronary intervention has been associated with better short-term outcome, but association with long-term survival has been reported from studies including selected patients.

WHAT THE STUDY ADDS

- Successful percutaneous coronary intervention is associated with short-term and long-term survival in out-of-hospital cardiac arrest patients.
- The present study provides a new argument for systematically considering coronary angiography in such patients.

Methods

Patients' Management

In the suburban Paris area (France), current management of OHCA involves mobile emergency units and fire departments. Patients in whom return of spontaneous circulation is achieved are then referred to a tertiary cardiac arrest center with an intensive care unit (ICU) and coronary intervention facilities available 24 hours a day, 7 days a week.

According to our local strategy,⁵ patients with no evidence for a noncardiac cause (sepsis, trauma, suffocation, hemorrhage, or any other obvious noncardiac cause) are directly admitted to the cardiac catheterization laboratory, regardless of clinical and ECG findings. An immediate coronary angiogram and a left ventricular angiography are then performed using standard techniques. A PCI is attempted if there is an acute coronary artery occlusion or if there is an unstable lesion that is considered as the cause of the arrest. Immediate PCI meant that successfully resuscitated OHCA patients underwent coronary angiography and PCI within the first 6 hours after collapse. No patient underwent delayed coronary angiography. When the cardiac cause is not obvious, a cranial tomodensitometry and a pulmonary angio-tomography are performed to look for a neurological or a respiratory pathogenesis, as previously described.¹⁰ After the procedures, all patients are admitted to ICU for further supportive treatment. Therapeutic hypothermia (33°C) is performed when indicated during the first 24 hours.

Data Collection

Patients' data were prospectively recorded in our database since 2000^{11,12} according to the Utstein style, as previously reported.¹³ Between 2000 and 2013, all consecutive OHCA patients were included in the study, regardless of the cause or the diagnostic and therapeutic management they had been provided. Patients who did not undergo immediate coronary angiography were included in the analysis. The following prehospital, intrahospital, and after-hospital discharge information were prospectively recorded for each patient: demographic data, clinical parameters, cardiac arrest location, time from collapse to basic life support and time from basic life support to return of spontaneous circulation, initial cardiac rhythm at Emergency Medical Services presentation, performance of PCI, hypothermia management, and vital status at ICU discharge. Post-resuscitation shock was defined as the need for vasopressors (epinephrine or norepinephrine) lasting >6 hours, despite adequate fluid loading or the need for intra-aortic balloon pump counterpulsation.¹⁴ Cardiac arrests were considered to be of cardiac cause if any structural or nonstructural cardiac

abnormalities were evidenced as being causative of the event. All other cases were considered to be of extracardiac cause.

Outcomes Assessment

The outcome measure was all-cause mortality status, and we distinguished between short- and long-term outcome. Day-30 mortality status after hospital admission was the short-term outcome and was treated as a binary variable. In those who survived after day-30, time to long-term death was the dependent variable and follow-up of mortality ended up on March 31, 2013.

To ensure exhaustive assessment of the vital status for all participants, we used multiple strategies. The first step was to collect mortality data from our hospital database and to record the last follow-up date. In a second step, we interrogated patients, proxies, and healthcare professionals (in particular the patient's usual physician) through phone interviews and postal and electronic mailings. We also collected individual mortality data from the French Epidemiological Center for Medical Causes of Death (CepiDC-INSERM) database. Finally, still unknown vital status was determined by querying public records office: we interrogated the birth registry office of patients' birthplace to obtain their vital status at the time of call (because each death is systematically recorded in the town hall of birthplace). Our local ethics committee approved the study.

Statistical Analysis

Descriptive statistics were reported as median (with interquartile range) and proportion (percentage) for continuous and categorical variables, respectively, unless otherwise specified. Patients were divided into 3 groups: patients without coronary angiography (reference group), patients with coronary angiography without PCI, and patients with both coronary angiography and immediate PCI. The baseline characteristics were compared using Pearson χ^2 test for categorical variables and Kruskal-Wallis test for continuous variables, as appropriate. Coronary angiography and PCI were binary variables.

The association between PCI and short-term mortality was investigated using logistic regression. Time to long-term survival according to early PCI use status was first plotted on Kaplan-Meier curves, which were compared using the log rank test. Then the association of PCI with long-term mortality was quantified using Cox proportional hazard model. Short-term mortality and time to long-term mortality were the dependent variables, whereas PCI and other confounding factors, including the Utstein criteria, post-resuscitation shock, and therapeutic hypothermia, were the independent variables (those with P value <0.20 were selected for multivariate analysis). Two-by-two cross-produced terms between PCI and each confounder were tested one at a time in the fully adjusted model, and a P value <0.10 was considered as clinically meaningful.

Finally, in a sensitivity analysis and to control for indication bias, we estimated the association of PCI with short- and long-term survival after propensity score-matching analysis. We determined the propensity score of PCI for each patient by conducting a multivariable logistic regression analysis (with PCI as the dependent variable), including age, sex, cardiac arrest location, initial shockable rhythm, presence of one witness, bystander cardiopulmonary resuscitation, duration of resuscitation, and therapeutic hypothermia as covariates. We matched patients according to their PCI status using a 1:1 matching procedure without replacement and a caliper width of 0.08 (ie, 0.2×standard deviation of the logit of the propensity score¹⁵) and then estimated the short-term and long-term mortality risk associated with PCI using logistic and Cox proportional hazard regression models, respectively.

All tests were 2-sided with P <0.05 considered statistically significant. We performed analyses using STATA/SE 11.0 software (College Station, TX).

Results

Baseline Characteristics

Between 2000 and 2013, 1722 nontraumatic consecutive OHCA patients were included in the analysis. Baseline

characteristics are shown in Table 1. Patients included in the analysis were mostly male (n=1231, 71.5%), with a median age of 60 (50, 72) years. Cardiac arrest was located in a public place in one third of cases and was witnessed in 1426 (86.7%) cases. Median duration of resuscitation efforts was 20 (12–32) minutes. Post-resuscitation shock was observed in around half of the cases (n=1012; 58.8%).

Immediate coronary angiography was performed in 1094 (63.5%) patients. PCI was performed in 479 (27.8%) cases within 6 hours after cardiac arrest (median time from collapse to PCI 1.5 [1.2, 1.9; range 0–5.8] hours; ESM). As shown in Table 1, patients receiving PCI were more frequently male and younger.

Short-Term Mortality

The overall day-30 mortality rate was 68.2% and was significantly lower in patients treated by immediate PCI compared with those treated with coronary angiography without PCI and those without coronary angiography (57.0% versus 65.4% versus 79.5%, $P<0.01$, respectively). In unadjusted analysis, early coronary angiography with PCI was associated with short-term mortality (odds ratio [OR]_{coro without PCI versus no coro} 0.49, 95% confidence interval [95% CI] 0.38, 0.45 and OR_{coro with PCI versus no coro} 0.34; 95% CI [0.26, 0.45]). Factors independently associated with day-30 mortality are reported in Table 2; younger age, initial shockable rhythm, bystander-provided cardiopulmonary resuscitation, shorter duration of resuscitation maneuvers, and therapeutic hypothermia were all inversely associated with short-term mortality, whereas postresuscitation shock occurrence was associated with an

increased risk of mortality. After adjustment for these factors, immediate PCI remained associated with a significant lower short-term mortality (OR_{coro without PCI versus no coro} 0.79, 95% CI [0.57, 1.08], $P=0.14$ and OR_{coro with PCI versus no coro} 0.61, 95% CI [0.43, 0.85], $P<0.01$). No clinically meaningful interaction was observed between PCI and confounders. In the subgroup of patients undergoing PCI, we found a strong association between time from collapse to PCI and day-30 mortality (OR_{per hour} 1.75 [1.09, 2.81] $P=0.02$; n=312).

Long-Term Mortality

The 466 patients who were still alive after day-30 could be followed-up for a median duration of 3.2 years [interquartile range, 0.7, 6.7], with a maximal follow-up of 13.5 years. After 3 years of follow-up, 295 of them were alive, whereas 66 were dead and 106 lost of follow-up. Overall mortality rate at year-3 and year-10 was 20.3% and 39.4%, respectively. Year-3 and year-10 mortality rates were lower in patients who had underwent PCI compared with those who had underwent angiography without PCI and those who had not underwent coronary angiography (9.0% versus 15.8% versus 31.5% and 13.5 versus 20.9 versus 48.7, $P<0.01$ for both, respectively). Unadjusted Kaplan–Meier failure curve according to coronary angiography and PCI status is shown in Figure 1. In unadjusted analysis, early PCI was associated with long-term mortality (hazard ratio [HR]_{coro without PCI versus no coro} 0.50, 95% CI [0.33, 0.76] and HR_{coro with PCI versus no coro} 0.25, 95% CI 0.16, 0.41). After adjustment for confounders, immediate PCI remained associated with long-term mortality (HR_{coro without PCI versus no coro} 0.78, 95% CI 0.45, 1.33, $P=0.35$ and HR_{coro with PCI versus}

Table 1. Baseline Characteristics of the 1722 Patients Included in the Study and Comparison Between Patients According to Coronary Angiography and Percutaneous Coronary Angiography

Variable	All Patients, n=1722	No Coronary Angiography, n=628	Coronary Angiography Without PCI, n=615	Coronary Angiography With PCI, n=479	P Value*	P Value†
Age	59.9 (49.6,72.2)	60.9 (46.8,77.6)	59.9 (50.6,69.7)	58.9 (50.8,70.1)	0.04	0.01
Male sex	1231 (71.5)	374 (59.6)	464 (75.4)	393 (82.0)	<0.01	<0.01
Arterial hypertension	597 (38.3)	201 (36.2)	237 (41.7)	159 (36.7)	0.11	0.18
Diabetes mellitus	253 (16.3)	74 (13.3)	105 (18.6)	74 (17.0)	0.05	0.02
Dyslipidemia	383 (24.8)	88 (16.0)	153 (27.4)	142 (32.4)	<0.01	<0.01
Current smoking	601 (43.1)	155 (32.2)	210 (40.9)	236 (59.3)	<0.01	<0.01
Public located CA	555 (32.3)	137 (21.8)	232 (37.8)	186 (38.9)	<0.01	<0.01
Time from collapse to ROSC	20.0 (12.0,32.0)	20.0 (10.0,31.0)	21.0 (13.0,31.0)	20.0 (13.0,34.0)	0.28	0.13
VF/VT	941 (54.6)	175 (27.9)	381 (62.0)	385 (80.4)	<0.01	<0.01
Witnessed CA	1426 (86.7)	487 (80.5)	515 (87.7)	424 (93.6)	<0.01	<0.01
Bystander CPR	774 (46.1)	253 (41.3)	282 (47.2)	239 (51.0)	0.01	<0.01
ST-segment-elevation on post-ROSC ECG	318 (18.5)	23 (3.7)	70 (11.4)	225 (47.0)	<0.01	<0.01
Therapeutic hypothermia	1222 (71.0)	366 (58.3)	497 (80.8)	359 (74.9)	<0.01	<0.01
Post CA shock	1012 (58.8)	373 (59.4)	360 (58.5)	279 (58.2)	0.92	0.69

Categorical variables are compared using a Pearson χ^2 test. Continuous variables are compared using a Mann–Whitney test or a Kruskal–Wallis test, as appropriate. CA indicates cardiac arrest; CPR, cardiopulmonary resuscitation; PCI, percutaneous coronary intervention; ROSC, restoration of spontaneous circulation; VF, ventricular fibrillation; and VT, ventricular tachycardia.

*Comparison between the 3 groups.

†Comparison between patients with and without coronary angiography.

Table 2. Factors Associated With Day-30 Mortality

	Odds Ratio	95% Confidence Interval	P Value
Age <60 y	0.58	0.45, 0.74	<0.01
Male sex	1.10	0.83, 1.46	0.52
VF/VT	0.40	0.30, 0.53	<0.01
Public setting CA	0.63	0.49, 0.82	<0.01
Witnessed CA	0.69	0.43, 1.09	0.11
Bystander CPR	0.66	0.51, 0.85	<0.01
Time from collapse to ROSC <20 min	0.27	0.21, 0.34	<0.01
Post resuscitation shock	2.15	1.69, 2.74	<0.01
Therapeutic hypothermia	0.65	0.49, 0.86	<0.01
Coronary angiography			
No coronary angiography	1.00	1.00, 1.00	...
Coro without PCI	0.79	0.57, 1.08	0.14
Coro with PCI	0.61	0.43, 0.85	<0.01

Multivariate logistic regression. N=1610. CA indicates cardiac arrest; CPR, cardiopulmonary resuscitation; PCI, percutaneous coronary intervention; ROSC, restoration of spontaneous circulation; VF, ventricular fibrillation; and VT, ventricular tachycardia.

0.40, 95% CI 0.23, 0.70, $P<0.01$). Confounding factors associated with long-term survival were younger age and an initial shockable rhythm (Table 3). As for short-term mortality, patients who underwent coronary angiography without PCI had a nonstatistically significant decreased odds of long-term mortality. In the subgroup of patients undergoing PCI, no association was observed between time from collapse to PCI and long-term outcome (HR_{per hour} 1.47 [0.66, 3.27] $P=0.34$; n=116).

Sensitivity Analysis

After matching on propensity score, early PCI remained inversely associated with day-30 mortality (OR 0.64, 95% CI [0.38, 1.08], $P=0.10$) and long-term mortality (HR 0.29, 95% CI [0.14, 0.61], $P<0.01$; Figure 2).

Discussion

In this large cohort of OHCA patients, early coronary angiogram followed by immediate PCI was associated with a reduction in short-term (day-30) and long-term mortality (over 3.2 years on average) after adjustment for confounding factors. This relationship was robust to a propensity comparison approach designed to limit confounding. Moreover, this study highlights that barely one fifth of day-30 survivors were still alive 10 years after the event.

Finding and treating the cause of cardiac arrest is generally considered to be useful to prevent recurrence and subsequent clinical deterioration. Because acute coronary syndrome is a frequent cause of OHCA and because coronary revascularization improves the prognosis of patients with ACS, resuscitated patients of presumed cardiac cause could benefit from immediate coronary angiography with subsequent PCI if indicated. In the absence of large randomized studies, this strategy remains controversial. Even if recommended as being part of the postcardiac arrest bundle of care,¹⁶ performing a systematic coronary angiogram remains a matter of debate. Following the pioneering study of 1997,¹ many studies have reported the feasibility and a possible survival benefit from an early invasive approach.^{17,18} In the PROCAT study, examining a cohort of 435 OHCA patients without obvious extracardiac cause, successful PCI was an independent factor for survival, regardless of the post-resuscitation ECG findings (OR 2.1 [95% CI 1.2–3.7]).⁵ More recently, Bougouin and colleagues showed in 3816 OHCA cases that coronary angiography was associated with increased survival (OR 2.4, 95% CI 1.4–4.0, $P=0.001$) after adjustment for other prognostic factors.¹⁹ However, most of these previous studies used ICU or hospital mortality as end point. Our study confirms that an early-reperfusion strategy is associated with a benefit by using 30-day survival as end point. This end point is probably more accurate to assess the effect of the intervention because it encompasses all death events, even those occurring in the following days after discharge, whatever the cause. Interestingly, we observed that an early invasive strategy not resulting in PCI was neither harmful nor beneficial when compared with a conservative strategy.

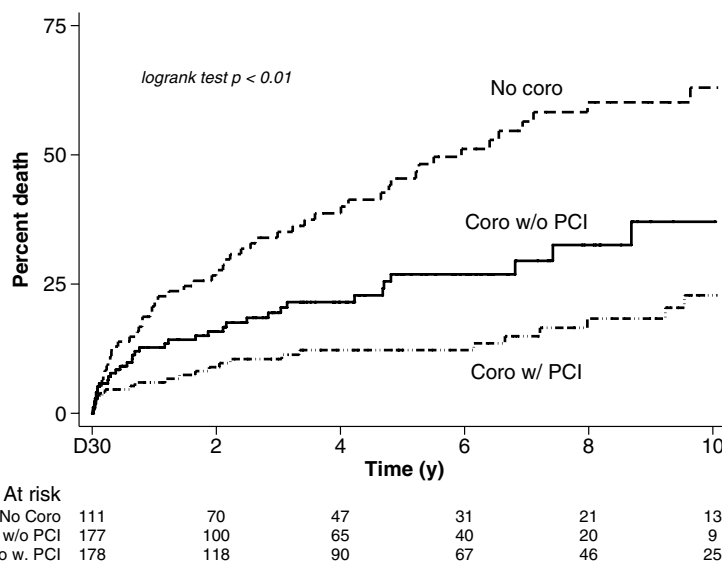


Figure 1. Univariate Kaplan–Meier survival curves with (w/) or without (w/o) immediate percutaneous coronary intervention (PCI).

Table 3. Factors Associated With Long-Term Mortality

	Hazard Ratio	95% Confidence Interval	P Value
Age <60 y	0.22	0.14, 0.34	<0.01
Male sex	1.53	0.97, 2.42	0.07
VF/VT	0.45	0.29, 0.71	<0.01
Public setting CA	0.67	0.45, 1.01	0.05
Witnessed CA	1.23	0.54, 2.80	0.63
Bystander CPR	0.91	0.61, 1.37	0.65
Time from collapse to ROSC <20 min	0.96	0.63, 1.45	0.84
Post resuscitation shock	1.41	0.96, 2.09	0.08
Therapeutic hypothermia	1.10	0.68, 1.77	0.70
Coronary angiography			
No coronary angiography	1.00	1.00, 1.00	...
Coro without PCI	0.78	0.45, 1.33	0.35
Coro with PCI	0.40	0.23, 0.70	<0.01

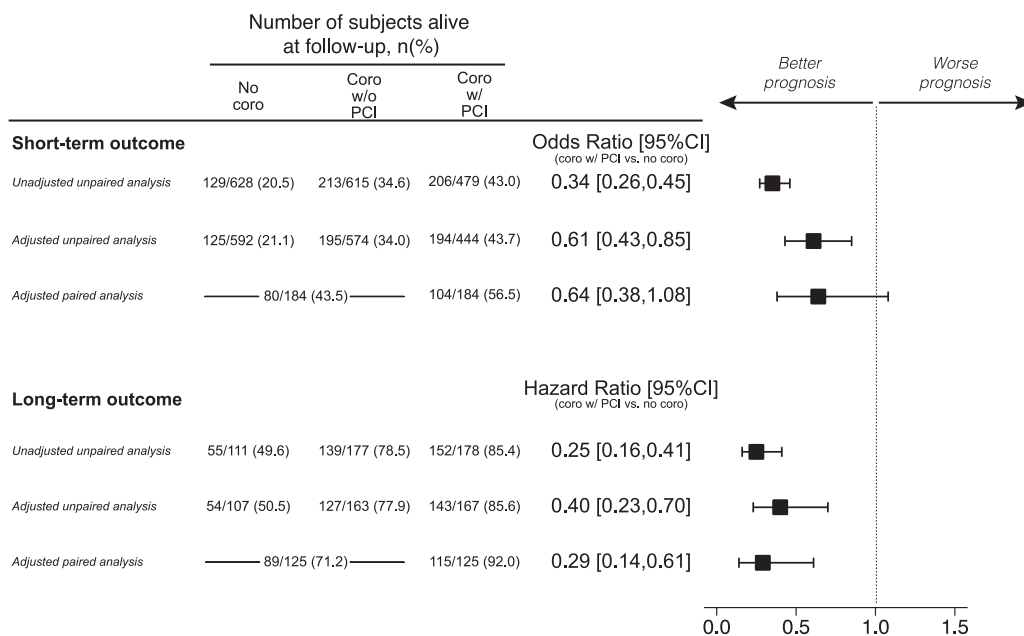
Multivariate Cox regression. N=437. CA indicates cardiac arrest; CPR, cardiopulmonary resuscitation; PCI, percutaneous coronary intervention; ROSC, restoration of spontaneous circulation; VF, ventricular fibrillation; and VT, ventricular tachycardia.

This observation suggests that such an early invasive strategy may be proposed in selected patients.

The few prior studies that have investigated the prognostic role of PCI beyond 30 days in OHCA patients rarely went above 6 months of follow-up, were of relatively small size, and were conducted on selected groups.²⁰ For instance, in 186 ST-segment-elevation myocardial infarction (STEMI) patients complicated by OHCA, prompt prehospital management and early revascularization were associated with a 54% survival rate at 6 months.⁷ To date, the only study that assessed the influence of early PCI on a longer-term period was performed in a large American hospital-based population.

In that study including n=1001 OHCA patients, early PCI was associated with a 54% relative risk reduction of mortality over 5 years.⁸ However, this study focused on hospital discharge survivors and did not take into account in-hospital period, which could leverage the long-term outcome. We were able to extend the association between PCI and outcome on both short- and long-term period. We demonstrated that in addition to a benefit on short-term outcome, early PCI has also a benefit on the long-term outcome, with a 59% relative risk reduction on long-term mortality over 3.2 years on average. The use of alternative statistical approaches, including propensity score-matching analyses designed to minimize selection bias by indication, provided consistent results, supporting the robustness of our findings.

The assessment of long-term outcome of OHCA patients remains challenging, and few clinical data are available regarding these patients. Nevertheless, prior studies on long-term outcome after cardiac arrest focused on selected patients or stratified their results in specific subgroups. Furthermore, our study provides important descriptive information regarding long-term mortality status of unselected cardiac arrest patients. In our study, all-cause 3-year mortality rate was 20.3% among day-30 survivors. These results are consistent with those of previous studies.^{7,20,21} In 200 ventricular fibrillation-related OHCA patients, Bunch et al reported 84 (42%) survivors at hospital discharge and 60 (30%) after a mean follow-up of 4.8 years.²² Compared with our findings, this higher survival rate is probably related to a selection bias, such as shockable rhythm at presentation, which is known to be a major determinant of outcome after OHCA. Several studies have previously highlighted the outstanding protective role of initial rhythm and cardiac arrest cause on outcome after OHCA.^{5,23} Our findings support the substantial and independent influence of initial rhythm on the long-term outcome, though it did not influence the benefit of early reperfusion.

**Figure 2.** Percutaneous coronary intervention (PCI) and early and late mortality.

We did not include the ECG pattern (absence or presence of ST-segment-elevation) in our analysis because it was never used in our algorithm decision to perform or not an immediate coronary angiogram. We and others^{1,5,24–26} have demonstrated that clinical data, ECG, and biomarkers lack specificity and sensitivity to predict an acute coronary occlusion as the cause of OHCA. We therefore favor performing an immediate coronary angiogram at admission in all survivors of OHCA without an obvious noncardiac cause of arrest, regardless of the ECG aspect. Several guidelines on coronary angiography in survivors of OHCA have used the presence or absence of ST-segment-elevation in coronary angiogram strategies for survivors of OHCA.^{27–29} In all, it is recommended to perform immediate coronary angiography in survivors of OHCA and STEMI-like ECG. Despite a high prevalence of significant coronary lesion in OHCA patients without ST-elevation, the beneficial effect of immediate coronary angiography and PCI remains a matter of debate.^{5,30} In a statement article by the European Association for Percutaneous Cardiovascular Interventions/Stent For Life groups, Noc et al recommend a short (<2 hours) ICU stop for survivors of OHCA with no ECG criteria for STEMI to eliminate a noncardiac cause of arrest. In the absence of the latter, a coronary angiogram should be performed.³¹ Even if intuitively interesting, this strategy is poorly evaluated. At that time, we still prefer performing a systematic coronary angiogram, regardless of the ECG pattern in all patients with no obvious noncardiac cause. This is supported by the PROCAT study, in which this strategy permitted to detect and to treat an acute coronary occlusion in nearly 25% of patients without typical STEMI on postresuscitation ECG. Further studies should be performed to evaluate the benefit of a systematic coronary angiography in successfully resuscitated out-of-hospital cardiac arrest patients without obvious electrocardiographic evidence of culprit coronary occlusion. A randomized controlled trial is currently recruiting successfully resuscitated OHCA patients without STEMI to investigate whether acute coronary angiography (ie, within 120 minutes after cardiac arrest) was safe compared with delayed coronary angiography (NCT02309151).

Several limitations can be addressed. First of all, the observational design of the study precludes any causal association, even if different methodological approaches, such as propensity score method, have been performed to minimize that bias. Second, several potential confounders were not included in our analysis. For instance, the influence of medication or preclinical patient conditions in the prehospital and intrahospital settings and after hospital discharge could not be adjusted for, as well as implantable cardioverter-defibrillator implantation and withdrawal of life-sustaining measures. Also, it is more difficult to exclude extra cardiac cause of the arrest in the non-PCI patients, which could account for the worse prognosis observed in this group. Third, these findings come from a single center, limiting the generalization of the results. However, this limitation should be considered in the context of the large cohort of patients using a standard approach to data abstraction and care. Fourth, we did not systematically collect stent thrombosis and morbidity and mortality related to such an adverse event. Even if prevalence in previous reports remains controversial, we cannot evaluate it and its impact on our results. Finally, the

study focused on the survival status and we assessed neither functional status nor quality of life during the follow-up.

In conclusion, immediate coronary reperfusion after out-of-hospital cardiac arrest was associated with significant reduced short- and long-term mortality.

These findings should suggest physicians to consider immediate percutaneous coronary intervention in these patients.

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Disclosures

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