To the Editor: Out-of-hospital cardiac arrest (OHCA) of cardiac origin is one of the leading causes of death in the industrialized world. The American Heart Association recommended patients who have been successfully resuscitated from OHCA and whose initial electrocardiogram (ECG) showing ST-segment elevation myocardial infarction (STEMI) should undergo emergent cardiac catheterization with the intent to identify and revascularize the culprit lesion by percutaneous intervention (PCI) when clinically applicable. However, few recent retrospective studies and prospective registries observed a beneficial effect of emergency coronary angiography and PCI on the outcome of resuscitated patients with OHCA. Emergency PCI seemed to improve in-hospital outcome of resuscitated but unconscious patients with OHCA in developed countries. However, data on how many patients with OHCA were able to receive emergency PCI are still lacking. Conversely, whether emergency PCI improves survival rate in patients who remain unconscious after OHCA in developing country is still debatable. This study retrospectively analyzed STEMI patients who suffered from OHCA in our department, and we hoped to provide some experience for future reference.

We retrospectively collected data of seven STMEI patients complicated by OHCA who remained unconscious when admitted to hospital, between September 2013 and December 2015 in the Department of Cardiology, Nanjing Drum Tower Hospital. Meantime, we selected 157 STEMI patients without OHCA during this period as control. All patients received emergency coronary angiograph and revascularization if needed. We registered patients’ baseline characteristics, including age, gender, risk factors, and previous angina. In cardiac arrest group, we recorded the time from symptom onset to consciousness loss, and time from consciousness loss to reperfusion.

During emergency PCI, TIMI Grade 3 was considered as successful criterion. Coronary angiographic data were also collected, including infarct coronary artery, collateral circulation, drug-eluted stent (DES) implantation, intra-aortic balloon pump (IABP) implantation, temporary pace maker implantation, and tracheal intubation. Coronary lesions ≥50% luminal diameter during angiograph was documented as coronary stenosis. Severe complications included hemorrhage, pulmonary infection, and death. Telephone follow-ups were made on 30 and 180 days. Chi-square test or Fisher’s exact test was used in categorical variables, and the independent-sample t-test was used for comparing medians. Kaplan-Meier curve was used to identify to 30 days and 180 days survival rate. IBM SPSS statistical 19.0 (IBM Co., USA) was utilized for statistical analyses. \( P < 0.05 \) was considered statistically significant. Seven cardiac arrest patients and 157 patients without cardiac arrest successfully received emergency PCI. There were no differences in baseline characteristics of the study population, except that 68 out of 157 patients in control group presented angina previously. Between groups, there were no differences in infarction area, infarct-related coronary artery, collateral circulation, or the number of atherosclerotic coronary artery. All patients had successfully received DES implantation and similar TIMI grade blood flow after DES implantation. However, patients with cardiac arrest received more IABP implantation and more tracheal intubation (5/7 vs. 27/157, \( P = 0.003 \); 7/7 vs. 0/1570, respectively). Four cardiac arrest patients received ice cap for the purpose of brain protection, and three received therapeutic hypothermia, the temperature was controlled between 33 and 35°C by ice blanket and maintained 24–48 h.

In Table 1, the time from symptom onset to first admission in patients without cardiac arrest was longer than OHCA group (\( P = 0.021 \)). Moreover, all OHCA patients presented ventricular fibrillation in emergency room. Thus, the D-B time was much longer than patients in control group (\( P = 0.025 \)). Due to patients’ critical condition, the complications in OHCA patients were much higher than control, including upper gastrointestinal hemorrhage (\( P < 0.001 \)), subarachnoid hemorrhage (\( P = 0.043 \)), subdural hemorrhage (\( P = 0.043 \)), and pulmonary infection (\( P = 0.000 \)). Thus, the hospitalization time was longer (16 [5,32] vs. 11.0 [1,31], \( P = 0.218 \)), and coma were more commonly seen in OHCA (\( P < 0.001 \)). At 30 days, the mortality rate was similar; however, there was significantly different between two groups in 180 days (\( P = 0.215 \) and \( P = 0.039 \), respectively; Table 1).

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Long-term prognosis after out-of-hospital cardiac arrest

Cardiac arrest (n = 7) 10/5/7/16/8/1/7* 0.218 7 3 3 0 0 <0.001

Impact of emergency coronary angiography on in-hospital mortality

16.0 (5,32) 0.043 / 0.025 185.4 (90,272) <0.001

11.0 (1,31) 0.215 0.039 0.025 175.4 (30,252) <0.001

Complications

Upper gastrointestinal hemorrhage
Subarachnoid hemorrhage
Subdural hemorrhage
Pulmonary infection
ICD implantation
Hospitalization time (days)

Table 1: Symptom onset to emergency percutaneous coronary intervention, complication, and mortality

All data were shown as n or median (range). D-B time: Door-to-balloon time; ICD: Implantable cardioverter-defibrillator; SEM: Standard error of the mean. *These 7 numbers mean the time of death from hospitalization. /: No data.

In China, fewer STEMI patients complicated by OHAC, who remained unconscious when arriving at the hospital, received emergency PCI; relevant clinical data are still lacking. Prompt PCI is a well-established strategy for treating STEMI patients, significantly reducing mortality. And also emergency PCI seems to improve in-hospital outcome of resuscitated but unconscious OHCA patients in developed countries. In CHINA-PEACE study, the ratio of cardiac arrest in STEMI is 1.7% in 2011. However, the ratio may be higher than 1.7%, and the ratio is 4.3% in our department. In Mage et al.’s retrospectively study, 1-month mortality is higher in the resuscitated group even after emergency PCI which is consist with our finding at 180 days’ follow-up. According to our study, OHAC patients who remained unconscious needed more circulatory and respiratory support, and these lead to more complications, such as hemorrhage and pulmonary infection, finally resulted in the higher mortality.

Bendz et al. examined the outcome after an OHCA and successful cardiopulmonary resuscitation in patients with acute STEMI treated with primary PCI; their in-hospital mortality rate was 27.5%. Because the time of cardiac arrest is too longer in emergency room subjected to the emergency level. Thus, D-B time is markedly prolonged, with poorer prognosis. In developing countries, lack of ambulatory ECG and ECG transporting system, the patient cannot receive diagnosis in time. This might be another reason.

However, it is a retrospective study with a relatively small population. The target temperature management maybe effective in OHAC remained unconscious, but this needs more sample to illustrate. We hope to continue registering data in multiple centers to further illustrate the real world in China.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s)/patient’s guardians has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients’ patient’s guardians understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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