International Journal of Gerontology 8 (2014) 70–73

Contents lists available at ScienceDirect

International Journal of Gerontology

journal homepage: www.ijge-online.com

Original Article

The Incidence and Risk Factors of Acute Asymptomatic Brain Infarcts After Percutaneous Coronary Intervention in Patients with Acute Myocardial Infarction☆

Ling-jie He [1 †], Jian-wei Zhang [2 † ‡], Qing Yang [2], Shu-jun Cao [3], Shi-wei Yang [2], Bin Nie [2], Xiao-han Xu [2], Yu-jie Zhou [2 *]

[1] *Department of Emergency, Beijing Friendship Hospital, Capital Medical University,* [2] *Department of Cardiology, Beijing An Zhen Hospital, Capital Medical University, Beijing Institute of Heart Lung and Blood Vessel Disease, The Key Laboratory of Remodeling-related Cardiovascular Disease, Ministry of Education,* [3] *Department of Cardiology, Beijing Da Xing Hospital, Capital Medical University, Beijing 100050, China*

ARTICLE INFO

Article history:
Received 11 November 2012
Received in revised form
7 November 2013
Accepted 10 December 2013

Keywords:
acute asymptomatic brain infarcts (aABI),
magnetic resonance imaging (MRI),
percutaneous coronary intervention (PCI)

SUMMARY

Objective: This study aimed to evaluate the incidence and related factors of acute asymptomatic brain infarcts (aABI) following percutaneous coronary intervention (PCI) in patients with acute myocardial infarction (AMI) via the right radial approach.

Patients and methods: Two hundred ten consecutive patients with AMI were enrolled. Multiple factors were compared between patients with (n = 37) and without (n = 138) aABI in 175 patients who underwent PCI.

Results: Of 175 patients with AMI, 37 (21.14%) developed aABI as determined by diffusion-weighted magnetic resonance imaging (MRI). Incidence of hypertension, proportion of primary PCI (p-PCI), Killip > 1 on admission, duration of procedure, and the frequency of device insertion into the coronary artery significantly differed between the aABI and non-aABI groups. These significant factors were reevaluated using logistic regression. Proportion of p-PCI, duration of the procedure, and the frequency of device insertion into the coronary artery were indicated as independent factors related to the incidence of aABI and others did not.

Conclusion: Cranial MRI imaging following PCI revealed that 21.14% of the patients with AMI had aABI. The independent factors related to aABI following PCI were p-PCI, duration of the procedure, and the frequency of device insertion into the coronary artery.

1. Introduction

For patients with acute myocardial infarction (AMI), percutaneous coronary intervention (PCI) is one of the most effective ways of maintaining cardiac function and decreasing mortality. Following equipment and technology development in PCI, the transradial intervention (TRI) is enlarged, especially in China. However, cardiac intervention is also a recognized cause of the serious complication of symptomatic acute ischemic stroke (sAIS), although the incidence is rare (0.11–0.38%)[1–5]. Recent advances in magnetic resonance imaging (MRI), such as diffusion-weighted imaging (DWI), have detected small and hyperacute lesions of ischemic stroke, even in patients without clinical symptoms. A previous study showed that the incidence of acute asymptomatic brain infarcts (aABI) was in 11% of patients undergoing elective coronary angiography and in 23% of those having elective PCI (e-PCI)[6]. Another study reported that patients with acute coronary syndrome (ACS) undergoing primary PC I(p-PCI) the incidence of asymptomatic acute ischemic stroke reached 34.7%[7]. The incidence and risk factors of aABI in patients with AMI after PCI through TRI were rarely reported. The current study assessed the incidence and related factors of aABI following PCI in patients with AMI.

☆ Conflicts of interest: The authors declare that they have no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

* Correspondence to: Dr Yu-jie Zhou, Department of Cardiology, Beijing An Zhen Hospital, Capital Medical University, Chao Yang District, Beijing 100029, China.
E-mail address: hlj925@sohu.com (Y.-j. Zhou).

† Ling-jie He and Jian-wei Zhang contributed equally to this paper.

‡ Jian-wei Zhang is the co-first author.

http://dx.doi.org/10.1016/j.ijge.2013.12.001

2. Patients and methods

2.1. Study design and study participants

We prospectively studied 210 patients with AMI in two large hospitals (Beijing Anzhen Hospital, Beijing Daxing Hospital) and Capital Medical University in Beijing. The inclusion period was February 2011 to October 2011. Our study included 175 consecutive patients with PCI through a right radial approach (study group), Of these patients, 118 were ST-segment elevation myocardial infarction (STEMI; 76 patients were treated by P-PCI, 24 patients were treated with thrombolytic therapy and e-PCI, 18 patients were treated with conservative therapy, and e-PCI) and 57 patients were non-ST segment elevation myocardial infarction (NSTEMI; 9 patients were treated with P-PCI, 48 patients were treated with conservative therapy and e-PCI). The study protocol was approved by the Medical Ethics Committee of Beijing Anzhen Hospital, Beijing Friendship Hospital, Beijing Daxing Hospital, and Capital Medical University (Fig. 1).

The control group was defined as 35 consecutive patients with AMI but without PCI because of any causes that could not complete coronary angiography. Of these, 14 patients with STEMI treated with thrombolytic therapy refused e-PCI, and 21 patients undergoing conservative treatment were unable to give informed consent.

All participants provided written informed consent to cranial MRI (Avanto 1.5T, SIEMENS, Germany), including FLAIR, DWI, T2- and T1-weighted MRI, and magnetic resonance angiography (MRA). The control group underwent these procedures within a mean of 2.0 ± 1.0 days after admission, and the study group underwent these procedures within a mean of 3.0 ± 1.0 days after PCI. Lesions that generated high intensity with a low apparent diffusion coefficient value on DWI were considered to be aABI[8]. Patients in the study group were assigned to subgroups based on the presence or absence of aABI. Cranial MRIs were interpreted by two radiologists who specialize in cerebral imaging and were unaware of the subgroup sequencing of the patients. We recorded the following factors: age, body mass index, (BMI) sex, coronary risk factors (smoking, hyperlipidemia, diabetes mellitus, and hypertension), ≥50% stenosis in the extracranial carotid arteries on MRA, and laboratory data.

2.2. Study definitions and catheter procedure

The diagnosis of AMI is defined as a clinical (or pathologic) event caused by myocardial ischemia in which there is evidence of myocardial injury or necrosis. Criteria are met when there is an increase and/decrease in cardiac biomarkers, along with supportive evidence in the form of typical symptoms, suggestive electrocardiographic changes, or imaging evidence of new loss of viable myocardium or new regional wall motion abnormality[9,10].

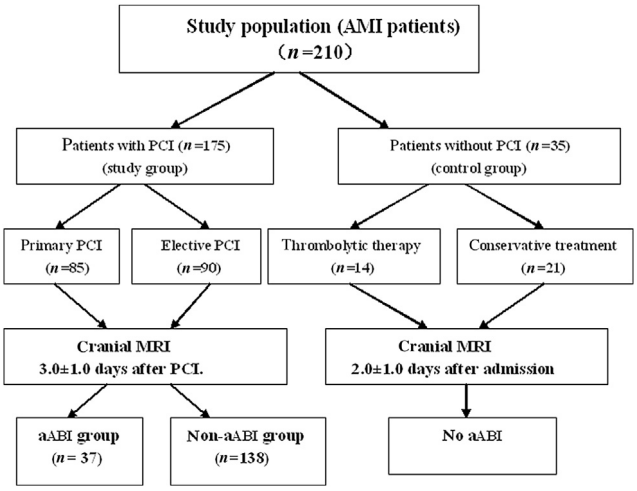

Fig. 1. Distribution of the population groups in the study.

Five cardiologists randomly performed PCI after admission. After oral administration of the loading dose of 300 mg of aspirin and 600 mg of clopidogrel, the routine maintaining dose of 100 mg of aspirin and 75 mg of clopidogrel was administered. The 175 consecutive patients underwent p-PCI and e-PCI through the right radial artery using a 6 French guiding catheter. Only the cobalt-chromium alloy, coronary RESOLUTE stent (Medtronic Inc, Minneapolis, MN, USA), was implanted according to operator discretion because of its nonferromagnetic properties. After a sheath was inserted, 5000 U of unfractionated heparin was administered and another 5,000 U were added before the initiation of e-PCI and p-PCI.

2.3. Exclusion criteria

Patients were excluded if they had contraindications to MRI, such as out-of-hospital cardiac arrest or circulatory support including intra-aortic counterpulsation or percutaneous cardiopulmonary support, history of cerebral ischemia (stroke or transient ischemic attack within the past 3 months), atrial fibrillations, valvular heart disease, congestive heart failure with low ejection fraction, unstable vital parameters, and pregnancy. Because TRI is in common use, during the period of our study, only four patients with right femoral approach and two patients with left radial approach were excluded.

2.4. Statistical analysis

Categorical data were presented as frequencies (percentages); continuous data were presented as mean value ± standard deviation. Continuous variables were compared between the two groups using the Mann-Whitney *U* test. Demographic variables for categorical data were compared using the chi-square or Fisher exact test where appropriate. Statistically significant factors were examined using multivariate logistic regression. A p value < 0.05 (two-sided) was considered significant. Data were analyzed with SPSS 21.0 software (IBM, Chicago, IL).

3. Results

Cranial MRI was safely accomplished in all patients. None of the control patients had aABI, whereas 37 in the study group had aABI (0% vs. 21.14%, $p = 0.006$). No one in the study population had sAIS. All aABI lesions were round in shape and their diameter was 1 cm or less on DWI. In the study group, the incidence of aABI was 21.14%. As shown in Table 1, the aABI and non-aABI groups comprised 37 and 138 patients, respectively. The incidence of hypertension and p-PCI significantly differed between the aABI and non-aABI groups, whereas age, BMI, sex, incidence of hyperlipidemia and diabetes mellitus, STEMI, and prevalence of extracranial carotid artery stenosis did not. We recorded the laboratory data on admission (Table 2). There were no significant differences in the laboratory data on admission among patients with aABI and those without aABI. We used some biochemical indicators to assess the severity of AMI (Table 3), maximum creatine kinase isoenzyme MB (CK-MB) mass, cardiac troponin-I (cTnI) and B-type natriuretic peptide values were not statistically significant. The patients with aABI experienced a higher rate of Killip classification (>1) on admission. Table 4 outlines the results of angiography characters and catheter procedure. Patients with aABI experienced greater duration of