Multivessel Percutaneous Coronary Intervention in Chinese Patients with Acute Myocardial Infarction and Simple Nonculprit Arteries

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ABSTRACT: *Background:* Multivessel percutaneous coronary intervention (PCI) for patients during acute myocardial infarction (AMI) is currently controversial. In this study, we investigated the significance of multivessel PCI in Chinese patients with ST-segment elevation AMI and relatively simple lesions in nonculprit arteries. *Methods:* We reviewed all consecutive primary PCI of ST-segment elevation AMI in our hospital between 2002 and 2005. The patients with multivessel disease and ACC/AHA type A/B1 lesions in nonculprit arteries who underwent multivessel PCI were identified (n = 105, multivessel PCI group), and 120 patients with single-vessel disease and treatment with primary PCI were enrolled as control subjects (single-vessel PCI group). The primary end points were the occurrences of 6-month major adverse cardiac events (cardiogenic death, nonfatal reinfarction, and target vessel revascularization). The secondary end points included procedure time, angiographic success rate, TIMI grade, reperfusion arrhythmia, ST-segment resolution, and left ventricular ejection fraction. *Results:* All patients with multivessel PCI tolerated the operations well and had similar TIMI 3 and angiographic success rates but longer procedure times than those patients with single-vessel PCI. There were no significant differences in reperfusion arrhythmia, ST-segment resolution, left ventricular ejection fraction, or 6-month MACEs between both groups. *Conclusions:* This study suggests that multivessel PCI is effective and safe for Chinese patients with ST-segment elevation AMI and simple lesions in nonculprit arteries. **KEY INDEXING TERMS:** Myocardial infarction; Multivessel disease; Angioplasty; Transluminal; Percutaneous coronary; Prognosis. **[Am J Med Sci 2007;333(6):376–380.]**

Percutaneous coronary intervention (PCI) is currently regarded as the optimal strategy for acute myocardial infarction (AMI), but only the infarct-related artery (IRA) can be treated, and treatment of severe stenosis of nonculprit arteries during AMI is contraindicated.[1–3] At present, with the use of stents and combined administration of aspirin, clopidogrel, and low-molecular-weight heparin, the benefits of PCI for some patients in both IRA and nonculprit arteries, that is, multivessel PCI, is worth re-evaluating.[4–6]

The aim of this study was to investigate the efficacy and safety of multivessel PCI in Chinese patients with ST-segment elevation AMI and relatively simple lesions in nonculprit arteries.

Methods

Study Group

The protocol used in the present study was approved by our institution's ethics committee. We reviewed retrospectively all consecutive primary PCIs of ST-segment elevation AMI cases that presented in our hospital between October 2002 and July 2005. The inclusion criteria were as follows: (1) prolonged chest pain lasting ≥30 minutes, (2) electrocardiographic changes in which the ST-segment was elevated by ≥0.1 mV in at least 2 limb leads or by ≥0.2 mV in at least 2 contiguous precordial leads, (3) a greater than twofold increase in serum creatine kinase-MB levels, (4) PCI was initiated within 12 hours of symptom onset or between 12 and 24 hours if there was evidence of ongoing isch-

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emia, and (5) complete baseline data were available. Exclusion criteria included: (1) antecedent coronary artery bypass grafting or PCI, (2) administration of fibrinolytic medication before the PCI, and (3) Killip class III or IV on admission. Among the reviewed patients, we identified 105 patients with multivessel disease (≥70% diameter stenosis of ≥2 coronary arteries or their major branches), in whom nonculprit arteries were subjected to angioplasty and/or stenting (bare metal stents) when the attending cardiologists found that IRA flow achieved a TIMI grade 3 after stenting and the lesions in nonculprit arteries were ACC/AHA type A or B1. These 105 patients were enrolled as the multivessel PCI group. We also randomly selected 120 patients among the reviewed consecutive patients who met the above delineated criteria with single-vessel disease to serve as control subjects (single-vessel PCI group).

Electrocardiogram and Left Ventricular Ejection Fraction

A 12-lead electrocardiogram was recorded on admission and 1 hour after PCI. The ECG criterion of microvascular reperfusion was defined by the presence of (≥50% initial value) ST-segment resolution 1 hour after PCI.[7] Before discharge, left ventricular ejection fraction (LVEF) was assessed by 2D echocardiography, using the simplified Simpson method.

Antiplatelet and Anticoagulant Regimens

All patients received aspirin (300 mg) and clopidogrel (300 mg) immediately on admission and for 3 to 6 months after PCI at a dosage of 100 mg/d aspirin and 75 mg/d clopidogrel. An initial bolus of heparin (10 000 U) was given intravenously, followed by additional hourly boluses of 2 000 to 2 500 U during PCI.

End Points

The primary end points of this study were the occurrences of major adverse cardiac events (MACEs), such as cardiogenic death, nonfatal reinfarction, or target vessel revascularization during 6-month follow-up. The secondary end points included procedure time, angiographic success rate, TIMI flow grade, reperfusion arrhythmia, ST-segment resolution, and LVEF. Angiographic success was defined as coronary lesion residual stenosis <20% and TIMI 3 flow grade.

Statistical Analysis

Data were presented as mean ± SD, frequencies, and percentages. The Student t test, χ^2, and Fisher exact test were used for analysis of all variables. Kaplan-Meier curves were used to estimate survival rates for the two groups. A value of $P \leq 0.05$ was considered significant.

Results

Patient Characteristics

Table 1 lists the baseline clinical characteristics of both groups. The rates of dyslipidemia and previous myocardial infarction in the multivessel PCI group were significantly higher than those in the single-vessel PCI group. Other parameters were similar in both groups. The use of statins, angiotensin-converting enzyme inhibitors, or angiotensin receptor block-

Table 1. Baseline Clinical Characteristics of Patients Who Had Single-Vessel or Multivessel Percutaneous Coronary Intervention

Variables	Multivessel PCI (n = 105)	Single-Vessel PCI (n = 120)	*P* Value
Men, n (%)	69 (65.7%)	79 (65.8%)	0.988
Age, yr (SD)	61.7 (±8.5)	60.2 (±9.8)	0.223
Risk factors			
Hypertension, n (%)	58 (55.2%)	56 (46.7%)	0.201
Diabetes mellitus, n (%)	15 (14.3%)	19 (15.8%)	0.746
Dyslipidemia, n (%)	64 (61.0%)	57 (47.5%)	0.044
Smoker, n (%)	32 (30.5%)	39 (32.5%)	0.745
Family history, n (%)	27 (25.7%)	35 (29.2%)	0.563
Previous CHF, n (%)	2 (1.9%)	2 (1.7%)	0.711
Previous MI, n (%)	5 (4.8%)	2 (1.7%)	<0.001
History of CVA or TIA, n (%)	6 (5.7%)	7 (5.8%)	0.970
Peripheral vascular disease, n (%)	3 (2.9%)	2 (1.7%)	0.880
Symptom-onset time to admission, h (SD)	7.5 (±4.2)	7.9 (±4.9)	0.508
Door-to-needle time, min (SD)	59.5 (±15.6)	61.4 (±16.5)	0.382
Infarct-related artery, n (%)			0.936
Left anterior descending	57 (54.3%)	68 (56.7%)	
Right coronary artery	32 (30.5%)	35 (29.2%)	
Left circumflex	16 (15.2%)	17 (14.2%)	
TIMI flow grade of IRA, n (%)			0.760
TIMI 0–1	78 (74.3%)	94 (78.3%)	
TIMI 2	18 (17.1%)	18 (15.0%)	
TIMI 3	9 (8.6%)	8 (6.7%)	
ACC/AHA lesion type of IRA, n (%)			0.862
A	7 (6.7%)	9 (7.5%)	
B1	33 (31.4%)	33 (27.5%)	
B2	37 (35.2%)	48 (40.0%)	
C	28 (26.7%)	30 (25.0%)	
No. of narrowed coronary arteries, n (%)			
2	91 (86.7)	0	0
3	14 (13.3)	0	

P value represents the significance of the difference between groups.
CHF, congestive heart failure; MI, myocardial infarction; CVA, cerebrovascular accident; TIA, transient ischemic attack; TIMI, Thrombolysis in Myocardial Infarction (grade); IRA, infarct-related artery.