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Case report

Which technique is suitable for management of acute myocardial infarction following coronary artery bypass surgery, rescue percutaneous coronary intervention or open heart surgery? A case-series study

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Summary. One of the serious complications followingcoronary artery bypass surgery is postoperative acute myocardial infarction commonly due to graft thrombosis, kinking, or spasm. Two recommended approaches for management of this event includeRescue percutaneous coronary intervention (PCI) and urgent open heart surgery. In the present case series, we described and compared early and long-term results of rescue PCI and reoperation in patients with three-vessel coronary artery disease undergoing CABG postoperatively and suffered acute myocardial infarction. (www.actabiomedica.it)

Key words: miocardial infarction artery bypass, percutaneous coronary intervention

Background

One of the serious complications which commonly occurred following coronary artery bypass surgery (CABG) is acute myocardial infarction due to graft thrombosis, kinking, or coronary artery spasm. This eventcan be manifested byappearing ST segment elevation and compromising hemodynamic state. There are three invasive approaches for removing this event including revision of grafts with or without cardiopulmonary bypass, emergency rescuePercutaneous Coronary Intervention (PCI), and medical management. The first approach certainly needs resternotomy in operating room and put additional grafts or correction of grafts problems probably leading to high mortality and morbidity because of hemodynamic instability. The second technique although seems to be more safe, but needs to transfer the patient to catheterization laboratory and performing emergency angiography. Comparing rescue PCI and other conservative methods in patients suffering cardiac ischemic events have shown a significant improved clinical consequences and favorable outcome, especially after thrombolysis failing (2). It has been also indicated that the incidence of mid-term composite endpoint events including death, recurrent myocardial infarction, brain stroke, and severe heart failureare significantly less frequentin those who undergoing rescue-PCI compared with the conservative-care and repeat-fibrinolysis groups indicating significant advantage of rescue PCI in preventing recurrent MI and even mid-term death (3). A few published studies have focused on comparing outcome

of rescue PCI procedure and emergency reoperation in cardiac ischemic patients. Hence,in the present case series, we described ten patients suffered post-CABG acute myocardial infarction and candidate for emergency revascularization with rescue PCI (4 patients) or reoperation (6 patients).

Methods

Demographic and clinical characteristics of 10 patients suffered from post-CABG acute myocardial infarction who undergoing rescue PCI procedure (4 patients) or emergent reoperation (6 patients) within four-year period from 2008 to 2012 were reviewed. These patients had no history of concomitant cardiac and non-cardiac operations. Final determination of ejection fraction was based on angiographic reports. CAD was considered significant if there was a 75% or greater stenosis in the cross-sectional diameter and 50% or greater stenosis in the luminal view.The following variables were collected for statistical analysis including the preoperative variables: 1) general characteristics: age and gender; 2) preoperative risk factors: hyperlipidemia, total cholesterol ≥ 5.0 mmol/l, HDL-cholesterol ≤ 1.0 mmol/l in men, or ≤ 1.1 mmol/l in women, triglyceride ≥ 2.0 mmol/l), family history of coronary disease(first-degree relatives before the age of 55 in men and 65 years in women), hypertension (systolic blood pressure ≥ 140 mmHg and/or diastolic ≥ 90 mmHg and/or on anti-hypertensive treatment), diabetes mellitus (fasting plasma glucose ≥ 11.1 mmol/l or ≥ 7.0 mmol/l or 2–hp ≥ 11.1 mmol/l), renal failure (creatinine > 355 μmol/l with a rise of > 44 units or urine output below 0.3 ml/kg for 24 h), cigarette smoking, opium use, cerebrovascular disease, peripheral vascular disease, and chronic lung disease; 3) preoperative cardiac status: recent myocardial infarction (an acute event with abnormal creatine phosphokinase and troponin levels), New York Heart Association (NYHA) score, arrhythmia, and previous CABG and PCI; and 4) preoperative homodynamic status: number of defective coronary vessels, left main disease ≥ 50%, and LVEF. We considered four criteria for a complicated postoperative outcome: 1) in-hospital postoperative complications including at least one of these: cardiac complications (heart block, cardiac arrest, tamponade, and atrial fibrillation) and non-cardiac complications (brain stroke, transient ischemic attack, renal failure, urinary tract infection, pulmonary emboli, pneumonia, acute limb ischemia, multi-system failure, continuous coma≥ 24 hours, and prolonged ventilation ≥10 hours); 2) prolonged LOS in ICU before and after surgery; 3) prolonged hospital stay before and after operation; and 4) long-term mortality rate defined as death within 1 to 5 years of operation.Results were reported as mean ± standard deviation (SD) for quantitative variables and percentages for categorical variables.

Results

Preoperative information

Four patients (M/F = 2/2, mean age = 61.5 ± 14.1 years) underwent rescue PCI and six patients (M/F = 5/1, mean age = 63.0 ± 7.3 years)underwent reoperation for management of post-CABG myocardial infarction. Regarding baseline characteristics and coronary disease risk factors, no differences were revealed between the two groups (Table 1). In rescue PCI group, none of the patients had family history of CAD, all of them were hyperlipidemic and three of them had concomitant history of hypertension and diabetes mellitus. The first man was current smoker and used opium regularly. Both men suffered recent myocardial infarction and one of them had history of renal failure undergoing hemodialysis. With respect to current oral medications, all patients received beta-blockers, three of them received nitrates and ACE-inhibitors, and only one of the women was administered calcium-blocker. None of the subjects were administeredantidepressants or digoxin. In reoperation group, family history of CAD was only observed in one patient, hypertension in 4 patients,hyperlipidemia in 3 patients, and diabetes mellitus in 4 patients. Two patients smoked cigarette currently, and one of them used opium concomitantly. Four patients experienced recent myocardial infarction, and 3 of them expressed to have congestive heart failure. Regarding medications, all patients were administered beta-blockers, 2 patients were administered calcium-blockers, 2 patients were administered ACE

Table 1. Baseline characteristics and clinical data of study subjects

Characteristics	Rescue PCI (n = 4)	Reoperation (n = 6)
Demographics		
Male to female ratio	2/2	5/1
Mean age, year	61.5 ± 14.1	63.0 ± 7.3
Medical history		
Family history of CAD	0	1
History of hypertension	3	4
History of hyperlipidemia	4	3
History of diabetes mellitus	3	4
Current cigarette smoking	1	2
Regular opium use	1	1
Recent myocardial infarction	2	4
Congestive heart failure	0	3
Oral medication		
Beta-blocker use	4	6
Calcium-blocker use	1	2
ACE-inhibitor use	3	2
Nitrate use	3	4
Hyperlipidemia use	4	4
Antidepressant use	3	4
Cardiac status		
LV ejection fraction	46.25 ± 12.50	35.0 ± 15.81
NYHA class	2.50 ± 0.58	3.00 ± 1.10

inhibitors, 4 patients used nitrates, 2 patients were administered fibrinolytics, 4 patients used anti-hyperlipidemics, and 4 of them also used anti-diabetic drugs. Regarding cardiovascular status, mean left ventricular ejection fraction in rescue PCI group and reoperation group was 46.25 ± 12.50% and 35.0 ± 15.81%, and mean NYHA class of 2.50 ± 0.58 and 3.00 ± 1.10, respectively with no significant discrepancy.

Postoperative outcome

Comparing postoperative early and one-year outcome showed more favorable results in the group who underwent rescue PCI in comparison with reoperation (Table 2). myocardial infarction, multisystem failure, and renal insufficiency was not occurred in rescue PCI group, while this events was revealed in 66.7%, 16.7%, and 16.7% of patients in another group respectively. As morbidity was defined as the appearance of at least one postoperative complication, the early morbidity rate in the two groups was 25.0% and 50.0%, respectively. Early and long-term death was not occurred in the group undergoing rescue PCI, but early and late death was occurred in 2 and 3 of 6 patients in reoperation group, respectively.

Table 2. Early and long-term outcome of study subjects undergoing recue PCI

Outcome	Rescue PCI (n = 4)	Reoperation (n = 6)
Prolonged ventilation (>48 hours)	0	1
Cardiac arrest	1	3
Hemorrhage	1	0
Myocardial infarction	0	4
Multi-system failure	0	1
Early morbidity	1	3
Prolonged hospital stay (>14 days)	1	1
Prolonged ICU stay (> 72 hours)	0	0
In-hospital death	0	2
5-year death	0	3

Discussion

Many recent studies have focused on clinical outcome of rescue PCI in patients suffered coronary artery disease, particularly following failed thrombolytic therapy. In a long clinical experience in Thailand, the angiographic success rate of this procedure was high with acceptable in-hospital mortality and rare major adverse cardiac events and thus this treatment method was introduced as a choice method for patients with acute myocardial infarction (3). In another study in Canada, rescue PCI was associated with lower risk of long-term adverse outcomes for patients with acute myocardial infarction who failed fibrinolytic therapy [4].Similar to previous observations, our case-series study also emphasized favorite postoperative outcome, as well as acceptable long-term survival in these patients compared with reoperation group so that we even achieved a perfect 5-year survival in our studied patients. Although our four studied patients had some underlying traditional risk factors including hyperlipidemia, hypertension, and diabetes mellitus and also suffered three-vessel coronary disease, but these variables seems not to be associated with poor outcome in these subjects. Meanwhile, some studies showed that advanced age, presence of postoperative cardiogenic shock, thrombolytic therapy in myocardial Infarction

flow grade 0-1 after PCI, and multivessalcoronary disease were predictors of survival and freedom from morbidity at 1 year of follow-up (5).

In total, despite presence of coronary risk factors and high severity of coronary involvement, rescue PCI can lead to proper early and long-term outcome in coronary artery disease patients in comparison with re-operation. Further studies with larger sample size and longer follow-up time should be performed to demonstrate appropriate clinical results following rescue PCI.

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