Original Article

Percutaneous Coronary Intervention in Very Elderly Patients. In-hospital Mortality and Clinical Outcome

Ernesto Oqueli, FRACP* and Ron Dick, FRACP

Victorian Heart Centre, Epworth Hospital, Melbourne, Australia

Background: There are very few data about percutaneous coronary intervention (PCI) in very elderly patients. This study was aimed at assessing the demographic, clinical and angiographic features, procedural characteristics and in-hospital results of very elderly patients (VEP), aged ≥85 years undergoing PCI and comparing their results with those of a control group (CG) of patients younger than 85 years undergoing PCI throughout the same period of time.

Methods and Results: Between November 2004 and January 2007, 1699 consecutive PCI procedures were evaluated, 102 (6%) PCI procedures were performed in VEP and 1597 (94%) in patients <85 years. The mean age in the VEP group was 87.4 ± 2.4 years vs. 66.7 ± 11.2 years in the CG ($p < 0.0001$). There were more females in the VEP group 49% vs. 22% than in the CG $p < 0.0001$. Acute coronary syndromes (ACS) were a more frequent indication for PCI in VEP than in the CG: ST segment elevation myocardial infarction (STEMI) 14.7% vs. 8.3%, $p = 0.025$ and non-ST segment elevation acute coronary syndromes 54.9% vs. 43.5%, $p = 0.024$. The proportion of drug-eluting stents used, although high in both groups, was lower in VEP than in the CG (86.5% vs. 92.9%, $p = 0.005$). Angiographic lesion success rates were similar in both groups (95.9%). Global unadjusted in-hospital mortality was higher in the VEP group in comparison with the CG 3.9% vs. 0.68%, $p = 0.01$. The difference in mortality was due only to PCI in patients presenting with STEMI (26.6% in VEP group vs. 3.7% in the CG $p = 0.007$). There were no in-hospital deaths in VEP presenting with stable coronary syndromes or other ACS. There were no differences in unadjusted in-hospital myocardial infarction, new revascularisation or stroke between both groups.

Conclusions: In patients ≥85 years old, PCI seems effective and carries an acceptable in-hospital mortality rate. The presence of STEMI substantially increases the risk of in-hospital death.

Introduction

Although octogenarians constitute a fast growing portion of cardiovascular patients [1] and also that coronary artery disease is a leading cause of mortality and morbidity in the elderly [2], few data are available on the outcome of very old patients (age >80 years) undergoing elective percutaneous coronary intervention (PCI), and there are conflicting data about the efficacy of PCI treatment of octogenarians with ST segment elevation myocardial infarction (STEMI) [1].

Structural and functional changes in the cardiovascular system with aging and higher co-morbidities make elderly patients more prone to unfavourable outcome [3]. Elderly patients have greater co-morbidity and more frequently present with acute coronary syndromes (ACS) and cardiogenic shock in comparison with patients younger

than 80 years of age [4]. The morbidity and mortality of coronary artery bypass surgery (CABG) may be prohibitive in the very elderly resulting in many patients being referred for PCI [2]. The results of percutaneous transluminal coronary angioplasty in elderly patients were disappointing because of low success rates and frequent complications prior to the stenting era [5–10]. Percutaneous coronary interventions with routine use of stents and antithrombotic drugs concomitantly have drastically changed the scope and results of PCI in elderly patients [2,9,10] improving procedural outcomes and reducing complications.

Clinical presentation to PCI is an important determinant of post-PCI outcome. A recent study has shown that clinically stable nonagenarian patients with coronary artery disease undergoing PCI have excellent PCI related prognosis while clinically unstable patients have a worse outcome [11]. Similar results were shown in another recently published study where despite overall good procedural success rates, the in-hospital mortality of very elderly patients differed significantly between patients with stable presentation vs. unstable presentation [2]. In-hospital mortality after percutaneous coronary inter-

vention has fallen for all age groups over the past six years. However, the largest absolute reduction was seen among patients 80 years of age or older [12].

The present study is aimed at assessing the demographic features, medical history, clinical presentation, coronary angiographic information, procedural characteristics and in-hospital outcomes of very elderly patients (VEP) aged ≥85 years and comparing their results with those in a control group (CG) of patients aged <85 years, in a contemporary unselected population of consecutive patients undergoing PCI.

Methods

Patient Population

All consecutive PCI procedures performed at Epworth Hospital from November 2004 to January 2007 were included for analysis.

Data Collection and Management

Data collected included demographic information, risk factors for coronary artery disease, medical history, clinical presentation, coronary angiographic information, procedural strategy and outcome and in-hospital outcome.

Coronary angiographic information before coronary intervention was analysed by quantitative coronary angiography using a validated edge detection system (VEPRO Sys). Reference vessel diameter (RVD) and lesion length were measured from the index angiogram. Other angiographic and lesion characteristics as well as procedural strategy and angiographic success of each significant coronary artery lesion attempted were also evaluated.

In-hospital outcome variables evaluated in this study were death, myocardial infarction and repeat revascularisation, collectively referred to as major adverse cardiovascular events (MACE). Other secondary measures of outcome analysed included major bleeding and puncture site complications. All procedural decisions, including device selection and adjuvant pharmacotherapy, were made by the patient's cardiologist performing the PCI.

Definitions

Very elderly patients were considered to be those aged ≥85 years. Death was defined as mortality from any cause. Myocardial infarction (MI) was defined in patients with normal baseline troponin values as evidence of two or more of the following: (1) an increase of cardiac biomarkers (preferably troponin) greater than three times the ninety-ninth percentile upper reference limit (URL); (2) typical chest pain lasting >20 minutes not relieved by nitroglycerin; (3) electrocardiographic changes indicative of new ischaemia (new ST-T changes or new left bundle branch block), development of pathological Q waves in the electrocardiogram; (4) new wall motion abnormalities. In patients where cardiac troponins were elevated before the PCI, MI was defined as a new elevation of CK >20% the pre-PCI value (this value should also exceed the ninety-ninth percentile URL) accompanied by at least one of the clinical, electrocardiographic or imaging criteria mentioned above. Repeat revascularisation was defined as new PCI of the target vessel or CABG performed during the same admission of the index PCI. Major bleeding was defined as any of the following: (1) haemoglobin decrease >40 g/l; (2) any haemorrhage requiring a transfusion or surgical intervention; (3) intracranial or retro peritoneal haemorrhage; (4) any bleeding generating haemodynamic instability. We considered vascular puncture site complication as the occurrence of any of the following: (1) pseudoaneurysm; (2) arterio-venous fistulae; (3) major bleeding related to puncture site. Multi-vessel disease was defined as the presence of >50% stenosis in two or more major epicardial coronary arteries. Angiographic lesion success was defined as a minimum stenosis diameter reduction to <30% and Thrombolysis in Myocardial Infarction (TIMI) flow 3. Patients who presented with MI and ST segment elevation were separated into two groups according to time from symptom onset: (1) those who underwent PCI within 24 hours of symptom onset were considered as STEMI patients, and (2) those who underwent PCI after 24 hours of symptom onset and before seven days, were considered as post STEMI patients. Patients who presented for PCI with a diagnosis of unstable angina (UA) or non-ST segment elevation myocardial infarction (NSTEMI) were evaluated collectively as non-ST segment elevation acute coronary syndromes (NSTE-ACS).

Statistical Analysis

Very elderly patients (aged ≥85 years) and patients in the control group (aged <85 years) were compared according to baseline clinical characteristics, risk factors, clinical presentation, baseline angiographic and lesion characteristics, procedural characteristics angiographic success, and in-hospital outcomes. Categorical variables are expressed as percentages and were compared with chi-square test or Fisher's exact test when expected cell values were <5. Continuous variables are presented as mean ± S.D. and were compared with independent-samples t-test. All p-values were two-sided. Statistical significance was assumed for $p < 0.05$. Statistical analysis was performed using SPSS version 10.0 (SPSS Inc., Chicago, IL).

Because outcomes in patients with ACS are different from those in patients with stable coronary syndromes, when mortality was evaluated patients were analysed as a group and were also subdivided and analysed into separate groups according to (1) clinical syndrome at presentation (ACS, stable coronary syndrome) and (2) specific clinical condition at presentation (STEMI, post STEMI, NSTE-ACS, stable angina, other).

Results

Between November 2004 and January 2007, 1699 consecutive PCI procedures were performed at Epworth Hospital in Melbourne. Of these, 102 (6%) PCI procedures were performed in VEP and 1597 (94%) were performed in patients <85 years (Fig. 1).