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Sustained 3-Year Benefits in Quality of Life After Percutaneous Coronary Interventions in the Elderly: A Prospective Cohort Study

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ABSTRACT

Background: Impact of percutaneous coronary interventions (PCI) on health-related quality of life (HRQOL) is important but under-reported in elderly patients. **Objectives:** To evaluate long-term health status in elderly patients who underwent PCI. **Methods:** Consecutive patients who underwent PCI at a university-affiliated hospital from September 2009 to June 2012 were prospectively enrolled with HRQOL assessment at baseline (up to 2 weeks before PCI) and at 6-, 12-, and 36-month follow-up using the EuroQol five-dimensional questionnaire descriptive profile and visual analogue scale (VAS). Minimally important benefit (MIB) in HRQOL was defined as greater than half an SD improvement in the baseline VAS score. **Results:** Of 1957 patients, 49.9%, 29.1%, and 21.0% were aged younger than 65 years, 65 to 74 years, and 75 years and older, respectively. Mean VAS scores at baseline (50.1 ± 20.5 vs. 51.6 ± 20.5 vs. 52.6 ± 21.8; $P = 0.09$) and at 36 months (72.9 ± 14.0 vs. 72.8 ± 16.1 vs. 72.0 ± 14.8; $P = 0.77$) were similar between the three age groups, respectively. MIB at 36 months was observed in 65.7%, 61.9%, and 61.2% of patients in each age group, respectively. Proportion of patients aged 75 years and older reporting problems in pain/discomfort and self-care reduced from 91.2% and 24.8% at baseline to 41.4% and 10.1% at 36 months, respectively (both $P < 0.01$). Independent predictors of MIB in HRQOL at 36 months in patients 75 years and older included poor baseline HRQOL, MIB at 6 months, and presentation with myocardial infarction (all $P < 0.01$). **Conclusions:** Elderly patients experienced sustained long-term improvement in quality of life comparable with younger patients after PCI. Our findings suggest that age per se should not deter against revascularization because of sustained benefit in HRQOL.

Keywords: elderly, EQ-5D, health-related quality of life, percutaneous coronary intervention (PCI).

Introduction

The world's population is rapidly aging and as the number of elderly increases, the burden of coronary artery disease (CAD) is set to grow. Percutaneous coronary intervention (PCI) is a well-established treatment for symptomatic CAD. Nevertheless, elderly patients are less likely to undergo revascularization than younger patients despite having more extensive CAD [1,2]. Age alone is often the main reason why PCI is avoided. Moreover, elderly patients are often frail and have multiple comorbidities, which increase the risks associated with PCI [3,4]. Over the last decades, advancement in PCI outcomes has led to an increasing number of elderly patients undergo revascularization for symptomatic CAD [5,6]. There is growing evidence that elderly patients who undergo either PCI or coronary artery bypass grafting (CABG) experience significant improvement in health-related quality of life (HRQOL) [7–14]. From the perspective of the elderly patient who may have limited life expectancy, symptom control, improvement in HRQOL, and maintenance of independence are particularly relevant and should be considered as clinically meaningful outcome measures in addition to survival benefits after revascularization.

There remains an important knowledge gap in evaluating the long-term HRQOL benefits of PCI in contemporary practice and in understanding factors associated with improvement in HRQOL that will inform physicians and elderly patients regarding decisions on PCI. Studies have shown that patients tended to experience greater improvement in HRQOL from CABG than from

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PCI [7,14]. These earlier studies, however, were from the era before the advent of drug-eluting stents, which have led to a dramatic reduction in restenosis, recurrence of angina symptoms, and the need for repeat revascularization compared with bare-metal stents in these earlier studies [15]. In this study, we aimed to evaluate the long-term impact of PCI on health status, including quality of life in elderly patients. We tested the a priori hypothesis that the HRQOL benefits were significantly different between younger and elderly patients, and aimed to evaluate factors independently associated with better HRQOL among these patients.

Methods

Subjects

The study population consisted of 1957 consecutive patients who underwent PCI from September 2009 to June 2012 in the Prince of Wales Hospital, Hong Kong (Fig. 1). The elderly (aged ≥75 years; n = 410) were compared with older patients aged 65 to 74 years (n = 570) and patients younger than 65 years (n = 977). Demographic, clinical, and procedural characteristics were prospectively recorded in case report forms using standardized definitions for all fields. The study protocol was approved by the ethics committee of the joint Chinese University of Hong Kong—New Territories East Cluster (CRE-2009.041) and informed consent was obtained from all patients.

HRQOL Assessment

Health status assessment was performed at baseline (period up to 2 weeks before PCI) and at 6-, 12-, and 36-month follow-up using the three-level EuroQol five-dimensional questionnaire (EQ-5D), which is a self-administered instrument comprising two components: a descriptive profile and a single-index visual analogue scale (VAS) score. The descriptive profile assesses health status in five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. There are three ordinal-scaled answers for each question: 1) no problems, 2) moderate problems, and 3) extreme problems. The VAS score assesses the patient's own perspective of their current health status on a vertical rating scale with scores ranging from 0 (worst imaginable health state) to 100 (best imaginable health state). The EQ-5D and VAS have been validated and demonstrated to provide reliable measures of HRQOL in large populations of healthy individuals and individuals with CAD and other forms of cardiovascular diseases [16,17]. Health state profile data, such as the EQ-5D, are often transformed into an index/utility score using sets of weights derived from the local population. Nevertheless, no local sets of weights are available and any other set of weights can introduce external variance that can distort changes in health status between groups or over time. Therefore, we reported individual EQ-5D dimensions and the VAS score to directly assess patient-reported outcomes. Recent studies have shown that EQ-5D profile data can provide better insight into the nature of changes in patient-reported health that would be obscured by summarizing these profiles by their index scores [18,19] and that observed differences in the VAS score reflect overall health that is closer to the patient's perspective [20].

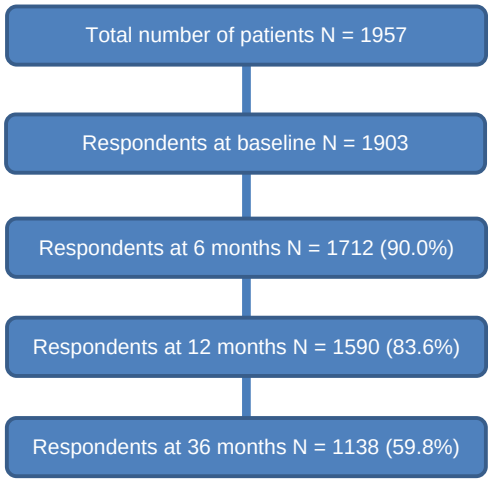

Fig. 1 – Flowchart of patient cohort who completed HRQOL follow-up. HRQOL, health-related quality of life.

We used a distribution-based approach to compare observed changes in HRQOL between baseline and follow-up with an index of variability to determine whether changes in HRQOL were substantial and clinically meaningful [21–23]. We defined minimally important benefit (MIB) in HRQOL as greater than half an SD of the baseline score (MIB threshold), which has been shown in studies to represent a clinically significant change [21–23]. To calculate the MIB threshold, the mean baseline VAS score with SD was calculated from the overall group. Then, half of the SD was added or subtracted from the baseline score of each patient, which gave a range of baseline VAS scores. This baseline VAS score range was then compared with the follow-up VAS score of each patient. A follow-up VAS score that was within this baseline range was considered unimportant benefit or deterioration, whereas a score beyond the baseline range was considered an important benefit (i.e., MIB) or deterioration. MIB in HRQOL was achieved when the follow-up VAS score was greater than half of an SD above the baseline VAS score.

Clinical Follow-Up

In-hospital complications were recorded at the time of discharge. Follow-ups at 6, 12, and 36 months were conducted by interview or telephone to assess HRQOL and clinical outcomes including death, myocardial infarction (MI), target vessel revascularization (TVR), and composite major adverse cardiac events (consisting of death, MI, and TVR). Death included all-cause mortality. TVR was clinically driven repeat revascularization in the follow-up period because of restenosis either within the target lesion or within the same epicardial coronary artery. Cardiac events were confirmed from review of patient medical records through a dedicated electronic system that recorded patient events, hospitalizations, and details of clinic follow-up. Cause of death outside hospital was confirmed with the patient's family or primary care physician.

Statistical Analysis

Categorical data were expressed as percentages, and continuous variables were expressed as mean ± SD. Patients' baseline characteristics were compared between different age groups on the basis of the Fisher exact or Pearson χ^2 test as well as analysis of variance tests as appropriate. We calculated the proportion of respondents with an important and unimportant benefit or deterioration and those reporting no problems, moderate problems, and extreme problems in each of the dimensions of the three-level EQ-5D.

Only patients with complete baseline and follow-up data (n = 1138) were included in the primary analysis to identify independent predictors of MIB in HRQOL (i.e., more than half an SD change from baseline VAS score). Univariate variables with a P value of less than 0.10 were included in multivariate models. Variables used included baseline VAS score, Canadian Cardiovascular