Editorial

Coronary surgery in elderly: it is never too late

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Provenance: This is an invited Editorial commissioned by the Section Editor Feng Zhang (Department of Cardiology, Zhongshan Hospital of Fudan University, Shanghai, China).

Comment on: Yamaji K, Shiomi H, Morimoto T, *et al*. Effects of Age and Sex on Clinical Outcomes After Percutaneous Coronary Intervention Relative to Coronary Artery Bypass Grafting in Patients With Triple-Vessel Coronary Artery Disease. Circulation 2016;133:1878-91.

Submitted Nov 09, 2016. Accepted for publication Nov 11, 2016.

doi: 10.21037/jtd.2016.12.34

View this article at: http://dx.doi.org/10.21037/jtd.2016.12.34

The optimal revascularization strategy for patients with multivessel coronary artery disease (CAD) remains still debated (1-3). The decision to recommend coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI) should be driven by a comparison of the short-term and long-term effect on outcomes. It seems to be a large body of evidence from randomized controlled trials supporting a survival advantage from CABG compared with PCI in patients with multivessel CAD, in keeping with previous findings from large observational studies (4-7). These results have been similarly demonstrated both in the era of balloon angioplasty and bare metal stents (BMS) and in the era of drug-eluting stents (DES).

The expectancy and quality of life of the elderly population continue to increase. In the past two decades the definition of 'elderly' population in the cardiology literature has evolved: initially >70 years, then >75 years, and now >80 years of age. North America and Europe are experiencing an aging population. As there is an increasing number of people 80 years and older, there is a corresponding rise in the number of octogenarians undergoing cardiac surgical procedures, such as CABG. However, whether the survival benefit from CABG compared with PCI extends to the older segment of the population remains unclear. Extrapolations from current trials among younger patients (8-10) may not be accurate, also considering that the decision making in selecting the strategy of revascularization according to the patient's age has traditionally been arbitrary without proper evidence based process. PCI is often the preferred strategy in elderly patients, due to the perceived increased early risk with CABG (11).

A few observational studies have investigated the impact of age on late–survival probability loss from PCI compared with CABG, with discordant results.

An observational study by Hannan and colleagues (5), using data from New York's cardiac registries for patients with multivessel disease, found a nonsignificant trend toward a reduced risk for late death with CABG (adjusted CABG/PCI HR, 0.74; 95% confidence interval (CI), 0.55–1.00) for patients aged ≥80 years.

In the American College of Cardiology Foundation and The Society of Thoracic Surgeons Collaboration on the Comparative Effectiveness of Revascularization Strategies (ASCERT) study by Weintraub and colleagues (6), a lower mortality was reported for older (>65 years) patients with multivessel disease undergoing CABG compared with PCI [CABG/PCI risk ratio, 0.79; 95% CI, 0.76–0.82].

A New York study by Wu and colleagues (7) found that CABG patients had overall higher 5-year survival rates than DES-PCI patients (CABG/DES HR for propensity matched patients 0.71; 95% CI, 0.67–0.77). In addition, significantly lower risks of death were found for CABG for all age groups, although the level of significance was lower for older patients.

Recently, Hannan and colleagues (11) found that older patients (age ≥75 years) experienced similar mortality rates for CABG and PCI with DES (DES/CABG HR, 1.06; 95% CI, 0.87–1.30) after a mean follow-up of 18 months.

Palmerini and colleagues (12) could not demonstrate a difference in 2-year mortality between CABG-treated

patients and those treated with DES for unprotected LMD.

Patients' ages categorization has been a major limitation of previous investigations as it is associated with loss of both power and precision of estimates. Cut-off points are arbitrary and manipulable and are not consistent across studies (13). Furthermore, the time at which "young" becomes "old" is in continuous transition and may continue to advance as improved public health and lifestyle changes allow people to live longer. Superelder patients were often excluded from the RCTs, and the age cut-off level of 65 years seemed not to be pertinent to define the elderly population in contemporary clinical practice.

In their recent study, Yamaji *et al.* (14) presented the results of their analysis of 5,651 patients from the Coronary Revascularization Demonstrating Outcome Study in Kyoto (CREDO-Kyoto) registry Cohort-1 and Cohort-2 who underwent either PCI (n=3,165) or CABG (n=2,486). The aim of this study was to evaluate the effects of the age and sex on clinical outcomes. Patients were divided into three groups according to the tertiles of age at the index procedures: ≤65 years (n=1,972), 66 to 73 years (n=1,820), and ≥74 years (n=1,859). To assess the effects of PCI relative to CABG for the individual clinical end points, they constructed Cox proportional hazard models in the entire cohort and in each age and sex category. Crude cumulative incidence of all-cause death was significantly higher in patients in the PCI group compared with those in the CABG group. After adjustment for confounders, the excess risks of PCI relative to CABG for all-cause death remained significant. PCI compared with CABG was also associated with a significantly higher risk of cardiac death, MI, HF hospitalization, and any coronary revascularization but had a similar risk for sudden death and a significantly lower risk for stroke. The cumulative incidence of all-cause death was significantly higher in the PCI patients than in the CABG patients in the age category of ≥74 years but not in the two younger categories. The excess adjusted mortality risk of PCI relative to CABG remained significant in the age category of ≥74 years, whereas the risk was neutral in the two younger categories.

The similar mortality between PCI and CABG in younger patients might be explained in part by the lack of adequate statistical power resulting from the small sample size with a small number of events (809 deaths in the 3,792 participants) because younger patients survive longer than older patients both after PCI and after CABG.

We have recently published a study that focused on the impact of PCI compared with CABG on early- and late-stage survival across individual patient age in multivessel CAD (15). Our results showed that PCI was not associated with a reduced early hazard across all age groups when patients were matched for all pre-treatment variables. Moreover, the late-stage survival benefit from CABG extended to the older segment of the study population, and this finding was confirmed when CABG was compared with DES-PCI only. Finally, our analysis supported the choice of using CABG rather than PCI regardless of the extent of CAD (including 2-vessel and 3-vessel disease), and CABG appeared to be superior to PCI in patients with LMD, as suggested by a recent meta-analysis of randomized controlled trials (16). These findings strongly support the hypothesis that age per se does not represent a contraindication for surgical revascularization in the presence of multivessel CAD.

As with all observational studies, a limitation of these studies is the selection bias introduced by not randomizing patients to the two treatments. Unmeasured risk factors (e.g., malignancy, dementia, poor mobility, frailty, severe concomitant illness) are usually not contained in the registries, and this omission could potentially introduce a bias when analyzing outcomes for the different procedures. It is reasonable to think that poor surgical candidates may have been more likely to have had PCI, whereas reasonable surgical candidates may have been more likely to be treated with CABG.

In a contemporary clinical practice CABG should be considered as a viable option for elderly patients with reasonable operative risk when they have complex anatomy unfavourable for PCI or significant risks for future heart failure.

Acknowledgements

Funding: This study was supported by the British Heart Foundation and the NIHR Bristol Cardiovascular Biomedical Research Unit (CH/92027/7163).

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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Cite this article as: Chivasso P, Benedetto U. Coronary surgery in elderly: it is never too late. J Thorac Dis 2016;8(12):E1641-E1643. doi: 10.21037/jtd.2016.12.34

