

## Drug-eluting stent or coronary artery bypass graft surgery in hemodialysis patients?

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Received: 23 November 2013 / Accepted: 24 November 2013 / Published online: 13 December 2013  
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The article by Baek and coworkers [1] published in this issue of the *Journal of Nephrology* provides valuable clinical information regarding the clinical outcome of surgical and endovascular myocardial revascularization procedures in patients with chronic kidney disease (CKD) in chronic hemodialysis.

Both coronary artery bypass grafts (CABG) and percutaneous coronary interventions (PCI) were performed under elective conditions and using standard techniques as available in a time period between 1999 and 2006; this included an internal thoracic artery in surgical candidates, off-pump surgery in a minority of cases (17 %) and implantation of drug-eluting stents (DES) in patients treated with PCI.

The study analyzed a population of 110 patients, 66 treated with CABG with at least one internal thoracic artery in 97 % of cases, and 44 treated with PCI and implantation of either rapamycin or paclitaxel DES in approximately 80 and 20 % of patients, respectively. Allocation of patients to CABG or PCI was a decision taken by the interventional cardiologist. Given some obvious baseline differences between the two groups, a propensity score analysis was performed to normalize for some of such differences. Indeed, CABG patients had significantly more severe coronary artery disease, as well as some other worse comorbidities, although these did not reach statistical significance.

At a mean follow-up period of 53.8 months the survival rate free of major adverse cardiac and cerebral events was better in the CABG group (HR 3.334, 95 % CI 1.482–7.498,  $p = 0.004$ ); however, the overall survival did not diverge significantly even after propensity score adjustment (HR 1.638, 95 % CI 0.555–4.839,  $p = 0.372$ ). The authors therefore conclude that CABG represents a better treatment strategy compared to PCI with DES for patients in chronic hemodialysis.

Publication of long-term clinical outcome of myocardial revascularization procedures in patients with advanced CKD is most welcomed since evidence of safety and efficacy in this population are scarce and often contradictory. Indeed, patients with advanced CKD are always excluded from trials testing myocardial revascularization options [2], likely because of the strong correlation that exists between heart and kidneys in determining patients survival, independently of the revascularization treatment [3]. Despite this major limitation of the available evidence, the Guidelines for Myocardial Revascularization of the European Society of Cardiology (ESC) issued in 2010 provided clear recommendations for the revascularization treatment of patients with CKD [4]. Basically, CABG was recommended as a preferred strategy compared to PCI in patients with multi-vessel coronary disease, moderate renal dysfunction and good general conditions with reasonable life expectancy, since the operative risk is low, and the long-term benefits of surgery appear evident with a longer follow-up [5]. On the contrary, patients with severe or end-stage CKD may derive less benefit from surgery given its most invasive nature. Indeed, a higher peri-procedural mortality and morbidity reduces the net clinical benefit and advantages of surgery at the long-term, and in the end, such a fragile population may benefit most from the less invasive PCI attempt, despite a higher recurrence of ischemic events requiring more re-interventions at the long-term [4].

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The data provided by Baek et al. confirm the statements of the ESC Guidelines, by showing a better event-free survival after CABG in patients already in dialysis, but without a significant advantage in mortality at long-term follow-up. Their investigation therefore, adds a coherent piece of evidence that further supports the strength of the already available recommendations.

Some considerations, however, should be taken in mind when analyzing the results of this article.

First is the process of patient selection. This being left at the “cardiologist discretion” and not the result of a randomization process, or at least, a multi-disciplinary Heart Team discussion, a selection bias cannot be excluded, with some potential surgical candidates being likely treated with PCI on the one hand, and perhaps selecting the anatomically easier, and/or clinically most fragile patients to PCI, on the other hand. Such differences, could certainly impact the long-term clinical outcome, but given the small size population, different outcomes may not emerge from this retrospective analysis despite appropriate statistical corrections.

Second, is the type of DES used in this study. Both, the rapamycin and the paclitaxel-eluting stents implanted in this series of patients, known as “first generation” DES, are no more available in the market given their inferiority compared to the so-called “second generation” DES. Indeed, despite the good performance of these devices compared to the non-medicated stents, first-generation DES were associated with significantly more clinical events such as stent thrombosis, myocardial infarction and restenosis compared to the more recent everolimus and zotarolimus-eluting stents, considered to be at present the new “state of the art DES” for PCI [6]. Although the advantages of second generation DES over old DES have not been tested in the specific setting of patients with CKD in a dedicated trial, growing evidence suggests that new DES provide safer and more effective clinical results in a broad clinical spectrum, including patients with CKD. Preliminary results from ongoing DES studies suggest that the efficacy of the new everolimus-eluting stents in reducing restenosis may be independent of the severity of the renal dysfunction [7].

Last, but by no means least, is the single-center, retrospective nature of the investigation and the small number of patients. In fact, results obtained in such conditions may not be easily replicated in other contexts and therefore should always be interpreted with due caution.

The link between kidneys and heart is such that the pathologic process in one of the two systems should be considered as altering a unique equilibrium of the cardio-renal unit. In fact, CKD is among the strongest predictors of long-term survival for patients with coronary artery disease undergoing CABG or PCI, and coronary disease is among the main causes of death in patients with advanced

CKD. Furthermore, CKD is more common in the elderly patient and with the increasing of life expectancy, the frequency of CKD is in continuous increment among the general population. In a similar manner, the growing incidence of diabetes mellitus in the general population provides further possibilities of developing a combined association of diabetes, CKD and coronary artery disease. According to US statistics, 14.4 % of the American population over 20 years of age have CKD a number that was expected to exceed 650.000 persons by the end of 2010 [8].

It is obvious then, that cardiologists and nephrologists should join, and share efforts to optimize the management of this delicate and ever growing population through active discussion and cooperation in daily practice with the creation of local Heart Teams and by developing dedicated studies that may offer better treatment alternatives in the near future.

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