MINIMAL EXTRACORPOREAL CIRCULATION IS A PROMISING ALTERNATIVE FOR OFF-PUMP REVASCULARIZATION IN ADULTS

To the Editor:

We read with great interest the article by Formica and colleagues.¹ They report their results of a prospective, randomized, single-center study on systemic and myocardial inflammatory responses, as well as the early clinical outcome after off-pump and minimized extracorporeal circulation (MECC)-guided coronary bypass surgery. Sixty patients were randomized: 30 patients each in the MECC and off-pump surgery groups. They found an increased interleukin-6 plasma level 24 hours after off-pump bypass surgery and increased tumor necrosis factor- α plasma level in both groups. Transmyocardial gradients did not differ between the groups. With regard to the clinical data, hemoglobin levels in the MECC group were significantly higher in comparison with the off-pump surgery group 24 hours after the operation (both groups received the same number of packed red blood cells).

Our group recently investigated 1674 patients who underwent elective, emergency bypass surgery with standard extracorporeal circulation, MECC, and off-pump surgery in a 3-year period.² Our results in terms of creatinine kinase values and time course were similar. In the postoperative period, patients received the

same number of packed red blood cells in the off-pump coronary artery bypass and MECC groups, whereas significantly more packed red blood cells were mandatory in the standard extracorporeal circulation group. Although postoperative drainage loss was higher in our analysis in the MECC group, the same postoperative hemoglobin values as in the off-pump group were reached. Although a cell-saving device was used in the MECC group, as well as in the off-pump coronary artery bypass and extracorporeal circulation groups, this equal administration of packed red blood cells in the MECC and off-pump coronary artery bypass groups is explained by the low priming volume less than 500 mL in the MECC group. As a further result of the good biocompatibility of the MECC device, the target activated clotting time is adequate at a range of 200 to 300 seconds and therefore approximately at the range in the off-pump procedure. Another interesting finding in our analysis for the MECC group was the reduced incidence of cerebral accidents compared with off-pump and standard extracorporeal circulation revascularization, although clampless proximal anastomoses with the heart string device were performed in the off-pump group. This may be explained by Liebold and colleagues,³ who described a better cerebral tissue oxygenation and a lower rate of microembolization during MECC surgery.³ Furthermore, we could improve the in-hospital mortality rate in comparison with the off-pump and standard extracorporeal circulation procedures in the MECC group.

In conclusion, we agree with Formica and colleagues¹ that MECC has great potential in the future of coronary bypass surgery. In our experience, MECC has the advantage of easy, safe, and reproducible revascularization with approximately the same benefits as off-pump surgery.

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Reply to the Editor:

My coworkers and I appreciate Puehler and colleagues' comments, and we are pleased that they agree with the conclusions of our study.¹ During recent years, there has been increasing interest in the use of miniaturized extracorporeal circulation (MECC), with good outcomes reported. Off-pump coronary artery bypass grafting (CABG) has had a dramatic increase during recent years because of several advantages relative to standard CABG with extracorporeal circulation (ECC) in terms of reduced in-hospital mortality and morbidity, reduced myocardial damage, and better protection of renal and pulmonary function. Many surgeons recognize some limitations of off-pump CABG, however, such as incomplete myocardial revascularization^{2,3} repeated revascularization,⁴ and higher hospital costs.⁵

We think that a primary objective during routine clinical activity is improvement of the technique of ECC and the biocompatibility of the tubing circuit to minimize systemic, cardiac inflammatory, and neurologic damage. ECC has improved through the years,

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