Letters to the Editor

Haemodynamic changes during off-pump surgery

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We read with great interest the article by Do et al. [1] on haemodynamic changes during off-pump coronary artery bypass surgery (OPCAB). A continuous cardiac output (CCO) Swan–Ganz catheter was used to assess cardiac output changes during distal anastomoses. One of the major limitations of thermodilution CCO catheters is that they do not provide continuous, real-time information. They provide intermittent measurements and it has been shown that the in vitro response time of a change in cardiac output is between 5 and 15 min [2]. Therefore the readings are accurate only in situations of haemodynamic stability, which cannot generally be assumed during cardiac manipulation and coronary grafting in OPCAB, especially when no intracoronal shunts are used. The period of distal anastomoses in OPCAB represents a dynamic period of continuous and very rapid haemodynamic changes. During that period administration of inotropes or vasoconstrictors is often required, as documented in the study by Do et al. Therefore, one of the continuous, real-time cardiac output monitoring techniques, such as the epiaortic ultrasonic probe or the LiDCO/PulseCO system, would be more valuable to track haemodynamic changes in OPCAB.

The authors observed significant falls of the mean arterial pressure (MAP) and relative preservation of the cardiac index during grafting of the obtuse marginal (OM) and posterior descending (PDA) coronary arteries. This is contrary to findings from previous studies, which demonstrate that during cardiac manipulation MAP is better preserved than the cardiac output due to compensatory vasodilatation [3,4]. The authors give us no information on systemic vascular resistance changes, although one would expect compensatory changes, especially as nearly half the patients received vasopressors during the OM and PDA anastomoses. The cardiac index changes were assessed in a subgroup of ten patients, while MAP changes were measured in the entire cohort of 55 patients. It would therefore be useful to know whether the subgroup of ten patients was representative of the entire sample, particularly in terms of left ventricular function. Moreover, during cardiac elevation in OPCAB there is considerable compression and distortion of the right cardiac chambers [5]. This may lead to tricuspid regurgitation, which would render thermodilution measurements of the cardiac output falsely high. It would be useful to know whether the tricuspid valve function was assessed during the TOE examination which was undertaken in six patients in this study or whether the authors have previously assessed valvular function with their technique for cardiac elevation.

Studies on haemodynamic changes during OPCAB are essential and will enable us to develop superior techniques of performing beating-heart surgery. However, the use of thermodilution catheters for cardiac output monitoring has important methodological limitations. We urge future investigators to use real-time cardiac output monitoring for evaluation of dynamic haemodynamic alterations during OPCAB. Real-time cardiac output monitoring will enable tracking of haemodynamic changes, facilitating dynamic therapeutic interventions to optimize cardiac performance.

References


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