

Editorial

Post-cardiac surgery arrest: what to do in the ICU (intensive care unit)

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Today, the most frequent issues addressed with regard to the cardiac intensive care unit deal with infection [1,2], bleeding [3], stroke [4], and other outcome related endpoints. However, the therapeutic strategies to be adopted for effective treatment of cardio-circulatory arrest early after open heart surgery, i.e. during the period such patients are in the intensive care unit (ICU) have not been discussed recently and deserve special considerations for a number of reasons.

First of all, not all patients operated on their heart recently are created equal. There are differences with regard to the access selected, the type of procedure performed, the pre- and postoperative cardiac function, the response of the other organ systems, the quality of the hemostasis achieved, and last but not least, whether the chest was closed or not.

Not all of this information is always readily available at the time of cardiac arrest, but there can be no doubt, that it is difficult to proceed quickly to open cardiac massage if the chest has not been opened completely during the primary cardiac procedure such as, for example, after TECAB or minimal-access valve repairs and replacements including those with trans-apical access [5,6].

The second reason for special considerations in case of cardio-circulatory arrest early after open heart surgery, i.e. in the ICU, is the fact that these patients have combined invasive and non-invasive monitoring throughout most of the time. Continuous EKG, arterial oxygen saturation, blood pressure, and other registrations allow for rapid incident identification and trend analyses. Immediate action for maintaining the circulation, as well as directed interventions for recovery of the cardiac function by the treatment of the underlying cause, is therefore often possible.

The third reason for special considerations in case of cardio-circulatory arrest early after open heart surgery, i.e. in the intensive care unit, is the fact that a high density of professional expertise is available immediately on the scene, and/or can be made available rapidly. It is well known that open cardiac massage is more efficient than closed chest massage. However, it is only in the presence of adequately trained professionals (i.e. surgeons) that this strategy is a promising option.

The fourth reason for special considerations in case of cardio-circulatory arrest early after open heart surgery, i.e. in the ICU, is the fact that many possible therapeutic strategies are only available there and in the operating theatre if the required human resources can be brought there in due time. The options to be considered here include all the heavy life supporting systems for mechanical assist (right, left, and bilateral devices) as well as ECMO [7,8] as a bridge to decision, bridge to recovery, bridge to bridge, or bridge to transplantation.

Time is heart and brain in this setting, and the guideline for resuscitation in cardiac arrest after cardiac surgery produced by Dunning et al. on behalf of the EACTS clinical guidelines committee in this issue [9] is a timely contribution for improved patient care. A further step could be the introduction of resuscitation check-lists (to be used routinely at the time of arrival of the patients in the ICU). They could provide the key information required for effective resuscitation like the possibility of closed chest massage (might be contra-indicated, e.g. in the presence of balloon expandable valved stents [5] that could get crushed and/or migrate during violent chest compression), optimal access to the heart for open massage (may require a full sternotomy *de novo*, and therefore a battery operated sternal saw must be available), the recommended vascular access for intra-aortic balloon counter-pulsation or ECMO [7,8], etc. For more about 'What to do in the ICU' read the paper by Dunning et al. [9] and Adam et al. [10].

References

- [1] Mastoraki A, Douka E, Kriaras I, Stravopodis G, Saroglou G, Geroulanos S. Preventing strategy of multidrug-resistant *Acinetobacter baumannii* susceptible only to colistin in cardiac surgical intensive care units. *Eur J Cardiothorac Surg* 2008;33(June):1086–90.
- [2] Heinze H, Rosemann C, Weber C, Heinrichs G, Bahlmann L, Misfeld M, Heringlake M, Eichler W. A single prophylactic dose of pentoxifylline reduces high dependency unit time in cardiac surgery: a prospective randomized and controlled study. *Eur J Cardiothorac Surg* 2007;32(July): 83–9.
- [3] Gelsomino S, Lorusso R, Romagnoli S, Bevilacqua S, De Cicco G, Billè G, Stefano P, Gensini GF. Treatment of refractory bleeding after cardiac operations with low-dose recombinant activated factor VII (NovoSeven®):

- a propensity score analysis. *Eur J Cardiothorac Surg* 2008;33(January):64–71.
- [4] Bisdas S, Therapidis P, Kerl JM, Papadopoulos N, Burck I, Herzog C, Vogl TJ. Value of cerebral perfusion computed tomography in the management of intensive care unit patients with suspected ischaemic cerebral pathology after cardiac surgery. *Eur J Cardiothorac Surg* 2007;32(September):521–6.
- [5] Walther T, Falk V, Borger MA, Dewey T, Wimmer-Greinecker G, Schuler G, Mack M, Mohr FW. Minimally invasive transapical beating heart aortic valve implantation: proof of concept. *Eur J Cardiothorac Surg* 2007;31(January):9–15.
- [6] Vahanian A, Alfieri OR, Al-Attar N, Antunes MJ, Bax J, Cormier B, Cribier A, De Jaegere P, Fournial G, Kappetein AP, Kovac J, Ludgate S, Maisano F, Moat N, Mohr F-W, Nataf P, Pierard L, Pomar JL, Schofer J, Tornos P, Tuzcu M, van Hout B, von Segesser LK, Walther T. Transcatheter valve implantation for patients with aortic stenosis: a position statement from the European Association of Cardio-Thoracic Surgery (EACTS) and the European Society of Cardiology (ESC), in collaboration with the European Association of Percutaneous Cardiovascular Interventions (EAPCI). *Eur J Cardiothorac Surg* 2008;34(July):1–8.
- [7] Tajik M, Cardarelli MG. Extracorporeal membrane oxygenation after cardiac arrest in children: what do we know? *Eur J Cardiothorac Surg* 2008;33(March):409–17.
- [8] Tsai C-W, Lin Y-F, Wu V-C, Chu T-S, Chen Y-M, Hu F-C, Wu K-D, Ko W-J, the NSARF Study Group. SAPS 3 at dialysis commencement is predictive of hospital mortality in patients supported by extracorporeal membrane oxygenation and acute dialysis. *Eur J Cardiothorac Surg* 2008;34(December):1158–64.
- [9] Dunning J, Fabbri A, Kolh P, Levine A, Mackay J, Pavie A, Strang T, Versteegh M, Nashef SAM. Guideline for resuscitation in cardiac arrest after cardiac surgery. *Eur J Cardiothorac Surg* 2009;36(July):3–28.
- [10] Adam Z, Adam S, Everngam RL, Oberteuffer RK, Levine A, Strang T, Gofton K, Dunning J. Resuscitation after cardiac surgery: results of an international survey. *Eur J Cardiothorac Surg* 2009;36(July):29–34.

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