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EDITORIAL COMMENTARY

Unique aspects of resuscitation practices in postoperative cardiac surgical care: A call to action

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Cardiac arrest after cardiac surgery is a relatively infrequent but serious event with an incidence ranging from 0.7% to 2.9%.¹ Although this can have potential devastating consequences, reported survival to hospital discharge is usually higher in these patients than in those who have in-hospital cardiac arrest occurring in other settings.¹⁻³ This is generally attributed to the immediate recognition capabilities in the intensive care unit, high rate of reversible causes, and rapid access to pacing, defibrillation, mechanical circulatory support, or potentially lifesaving emergency re sternotomy. Nevertheless, there is wide variation and lack of standard in resuscitation practices in this patient population, with outcomes largely dependent on the expertise of the personnel in charge at the moment of the event.

On the contrary, well-established protocols in the general population have streamlined the care of out-of-hospital and in-hospital cardiac arrest. Protocols, such as the well-known Advanced Cardiac Life Support (ACLS) and Basic Life Support (BLS), allow for smooth participation of the resuscitation team with known roles, responsibilities, and expectations in these stressful, otherwise chaotic situations.

For those who routinely care for cardiac surgical patients, it is not surprising to find that this patient population possesses unique characteristics and aspects of care, in whom traditional resuscitation practices can result in harm. Despite the description of this concept in multiple studies¹⁻³ and the development of a cardiac surgery life support training course,⁴ to date, there is no universally accepted standardized protocol-based approach to resuscitation in cardiac surgical postoperative care.

The expert review by Gosev and colleagues,⁵ published in this month's issue of the *Journal*, is a timely and thought-provoking article that describes the unique needs and characteristics of the cardiac surgical patient who experiences a postoperative cardiac arrest and how standard resuscitation techniques guided by ACLS may be detrimental in the acute postoperative setting, unveiling an important gap in contemporary cardiac surgical intensive care. Only recently, the value of specific cardiac surgical protocol-guided resuscitation has been emphasized in detail with a clear goal-directed protocol.^{1,4} The authors review

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the current evidence, including the European guidelines for resuscitation in this patient population,¹ and propose a practical protocol that incorporates the evolving areas of cardiac surgery, including minimally invasive procedures and patients with ventricular assist devices,⁵ highlighting the major features that set the cardiac surgical patient apart from patients experiencing cardiac arrests in other settings.

Some important and unique aspects of resuscitation care in this patient population that deserve mention include the following:

- The universal use of invasive monitoring and central venous access. These essential components of every new cardiac surgical patient can not only aid in immediate recognition of the event but also guide the resuscitative efforts in a controlled manner by having a target pressure for external cardiac massage (ECM) when necessary and central venous access for targeted and controlled dosing of vasoactive agents, such as epinephrine, because its indiscriminate use at standard ACLS dosing, has been associated, at least anecdotally, with severe bleeding due to marked rebound hypertension.
- The presence of fresh suture lines prone to massive bleeding with ECM and overzealous vasoactive medication administration with rebound hypertension once return of spontaneous circulation is achieved.
- Priority for defibrillation. Because time is the most important variable for successful defibrillation and the recognition of cardiac arrest is usually immediate, defibrillation attempts always should precede ECM.
- The availability of epicardial pacing wires for use in bradycardia/asystolic arrest.
- Access to mechanical circulatory support and emergency re sternotomy in a stepwise protocol-based approach.

Because the field of cardiac surgery is evolving rapidly with more complex procedures being performed with a

minimally invasive approach and the ever-growing field of mechanical circulatory support, the authors also dedicate a session on resuscitation after minimally invasive surgery, including transcatheter aortic valve replacement and robotic valvular surgery via minithoracotomy, as well as specific issues of resuscitation in patients with mechanical assist devices. However, an important reminder is that the proposed algorithm is recommended for use only in the cardiac surgery intensive care units, and standard resuscitation strategy in cardiac surgical patients should be used in the surgical step-down unit or surgical ward.

This review provides a further step closer to developing a new standard of resuscitation care in cardiac surgical patients and opens the door again to the possibility of creation of a universal resuscitation protocol for this complex patient population.

There are clear and unique characteristics of the cardiac surgical patient who experiences a postoperative cardiac arrest. Indiscriminate use of standard resuscitation techniques may cause harm. The development of a protocol-based cardiac surgery-specific resuscitation that incorporates those features is crucial and needed.

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