labCPR produced significant haemodynamic effects with adrenaline, no haemodynamic increases were seen with clinical CPR. Also the peak adrenaline level took 2.5 min to achieve in the clinical CPR group after a single administration.

7. Clinical bottom line

The European Resuscitation Council and the American Heart Association both recommend 1 mg of adrenaline as soon as pulseless electrical activity or asystole is identified or after the second failed shock if the rhythm is VF/pulseless VT. However, they acknowledge that the evidence behind this recommendation is lacking and based entirely on animal studies which have as yet not been successfully replicated in human studies and thus the evidence for this recommendation is 'indeterminate'. Thus, in the particular situation of a patient who arrests shortly after cardiac surgery where the chance of restoring sinus rhythm either by defibrillation or by an emergency re-sternotomy is high, and where adrenaline could in this situation be highly dangerous once sinus rhythm is restored, we recommend that 1 mg of adrenaline forms no part of the resuscitation protocol for patients after cardiac surgery.

References


eComment: Should adrenaline be routinely used by the resuscitation team if a patient suffers a cardiac arrest shortly after cardiac surgery?

Author: Stephen T. Webb, Royal Victoria Hospital, Grosvenor Road, Belfast, BT12 6BA, UK
doi:10.1510/icvts.2007.171447A
Cardiac arrest in the early postoperative period after cardiac surgery is usually rapidly reversible by appropriate treatment of the underlying cause [1]. Excessive hypertension induced by adrenaline following return of spontaneous circulation in this setting may cause catastrophic disruption of surgical anastomoses. The intravenous administration of a relatively low dose of adrenaline in the peri-arrest scenario may have similar consequences. The evidence to support the use of adrenaline in cardiac arrest is weak [2]. The intravenous administration of 1 mg of adrenaline should not be recommended in cardiac arrest after cardiac surgery. Emphasis should instead be given to external cardiac compression, immediate defibrillation, rapid correction of reversible causes and early emergency re-sternotomy if appropriate. The European Resuscitation Council (ERC) should consider changing their guidelines for the resuscitation of patients who suffer cardiac arrest following cardiac surgery [3].

References


eComment: Should adrenaline be routinely used by the resuscitation team if a patient suffers a cardiac arrest shortly after cardiac surgery?

Author: Michael J. Versteegh, Leiden University Medical Center, Department of Cardio-thoracic Surgery, Albijnensedreef 2, 2333 AC Leiden, NL
doi:10.1510/icvts.2007.171447B
Most of the time emergency re-thoracotomy is the effective method to solve the problem causing a circulatory arrest after cardiac surgery. The authors state correctly that there is no evidence for injecting adrenaline to treat the loss of circulation [1]. If the cause of the cardiac arrest is not resolved by the re-thoracotomy, the surgeon can very easily inject adrenaline directly into the left ventricle of the heart. Moreover, this method in combination with internal cardiac massage guarantees that the adrenaline
reaches the coronary circulation in contrast to an intravenous injection of adrenaline in the circumstances of a circulatory arrest.

Reference


eComment: Avoidance of administration of 1 mg of adrenaline in cardiac arrest shortly after cardiac surgery

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doi:10.1510/icvts.2007.171447C

I don’t recommend adrenaline for post CABG arrest [1]. I think it is better to come back to the operating room promptly, if normal condition doesn’t return after primary works. Placement of CPB, examination of grafts and redoing CABG (on pump, beating) is the best option. If grafts are apparently normal, then redo CABG from the most important target vessels (on pump, beating). After each graft we try to be off from CPB. If everything is OK, the chest is closed, if not, other important grafts will begin. I think immediate re-sternotomy for other post cardiac surgery arrest is the procedure of choice if external massage is ineffective.

Reference


eComment: Avoidance of administration of 1 mg of adrenaline in cardiac arrest after cardiac surgery

Author: Mark K. Reed, Saint Barnabas/Newark Beth-Israel Cardiac Surgical ICU, Newark, New Jersey 07039, USA

doi:10.1510/icvts.2007.171447D

Regarding the administration of (intravenous) epinephrine for the early-post-operative cardiac surgical patient after the fact of the occurrence of complete circulatory arrest [1] I am an agnostic.

That said, I have found i.v. bolus epinephrine can occasionally avert the aforementioned scenario for the patient in a rapid downward ‘death spiral’. In my experience this near-arrest physiology results from abrupt vasodilatory decompensation, for example when suddenly coughing (i.e. vasa salvi condition) as sedation wears off. And here is the point I would like to emphasize. The crucial form of epinephrine here is the 1 mg/10 cc (usually as a ‘Bristoject’ male leur lock adapter). Push and flush 50 to 100 mg (0.5 to 1 cc) and the patient in jeopardy pulls out of the dive just skimming the treetops. Push the ‘arrest dose’ of 1 mg/1 cc and as amply noted by others a bolus of 1 mg of adrenaline is indicated as soon as pulseless electrical activity or asystole is identified or after the second failed shock, if the rhythm is VF or pulseless VT. The target of this administration is double: firstly to induce ventilricular fibrillation or tachycardia (for a successful subsequent defibrillation), and secondly to increase the systemic vascular resistance and restore through this way, a better tissue perfusion. The most important of the targets mentioned above is the first, because the main demand in an asystolic patient in arrest is to retrieve any cardiac activity, even a ventricular fibrillation. However, the second target (to increase the systemic vascular resistance) is achieved much later, either after retrieving a normal rhythm or restoring the circulation by heart massage. In our opinion, adrenaline is indicated ONLY in the patients with no ventricular activity. If ventricular activity is recognized, the so called pulseless electrical activity (ventricular fibrillation or tachycardia), as in the patient in your scenario, the administration of adrenaline does not take place in CPR. Besides, in case of cardiac tamponade, we usually have an empty heart with no myocardial dysfunction, and the rhythm is mostly normal, or later (due to either myocardial hypoperfusion or/and metabolic acidosis) ventricular fibrillation is observed. In contrast, a myocardial dysfunction with dilation is observed in case of a rhythm characterized by junctional bradycardia, or asystolia. Especially in the cardiac surgical patient, the asystolic arrest is not rare. Systemic influences that increase extracellular K+ concentration, such as low PO2, metabolic acidosis, renal failure, hypothermia, hemolysis and myocardial trauma, contribute to a partial depolarization of normal or already diseased His-Parkinje system [4]. In this case of arrest, the administration of adrenaline and the abrupt performance of external cardiac massage, may ‘brace down’ the vicious circle until the reopening of sternotomy for a more effective massage. Obviously, after recovery of VT or VF and an unsuccessful defibrillation, administration of 1 mg adrenaline every 3 to 5 minutes is clearly indicated [2, 3]. While the moderate use of adrenaline during post-cardiac surgery arrest is desirable; as we avoid all its adverse effects on the myocardium (increased myocardial oxygen consumption, sustained arrhythmias, and further dysfunction), as well as on the brain (decreased cerebral flow, worsening of brain ischemia) [5].

References


