

SHOULD A RHYTHM CHECK PRECEDE DRUG ADMINISTRATION DURING CARDIAC ARREST?

To the editor: A patient who has suffered a sudden cardiac arrest has been defibrillated twice for ventricular fibrillation. After the second defibrillation, you resume chest compressions, initiate intravenous access, and prepare an epinephrine 1 mg bolus. During the pause after 30 chest compressions for ventilations, you notice this rhythm, Figure 1, on the monitor:

Which of the following steps would you do next?

1. Stop chest compressions and check for a pulse.
2. Continue cardiopulmonary resuscitation (CPR) for the full 2 minutes but hold the epinephrine until a pulse check confirms no pulse.
3. Continue CPR and give the bolus of epinephrine.

The correct answer according to the 2010 Advanced Cardiac Life Support (ACLS) Guidelines is option 3.¹ But option 2 may be a better choice.

The publication of the 2010 American Heart Association Guidelines

for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care marks the fiftieth anniversary of modern CPR.¹ They are based on the most current and comprehensive review of resuscitation literature available.

The Sunnybrook Hospital ACLS instructors were particularly interested in an issue we had found problematic in teaching ACLS and had hoped that these new guidelines would resolve the problem. The 2005 guidelines recommended “blind” drug bolus administration during CPR, that is, the administration of drugs without checking a cardiac rhythm or pulse.² We asked experts involved in the guideline review process to consider this issue. The expert panel debated the issue at length; however, the only reference to the issue is in the 2010 guidelines on page S739:

...if a shock results in a perfusing rhythm, a bolus dose of vasopressor at any time during the subsequent 2-minute period of CPR (before rhythm check) could theoretically have detrimental effects on cardiovascular stability. This may be avoided using physiologic monitoring... However,

adding an additional pause for rhythm and pulse check after shock delivery but before vasopressor therapy will decrease myocardial perfusion during the critical postshock period and could reduce the chance of achieving a return of spontaneous circulation (ROSC).¹

Not enough evidence was available to resolve the dilemma.

The 2010 guidelines have not changed from the 2005 ACLS guidelines in suggesting that during resuscitation of the pulseless patient, medications should be given without a rhythm or pulse check. This is illustrated in Figure 2. The guidelines do not recommend withholding the bolus dose of vasopressor even when an organized rhythm is seen on the electrocardiographic monitor or physiologic monitoring of end-tidal carbon dioxide, arterial pressure, or central venous oxygen saturation suggests a ROSC. The guidelines state that after a second defibrillation, “the drug should be administered during cardiopulmonary resuscitation (CPR) before or after shock delivery.”² The teaching materials developed

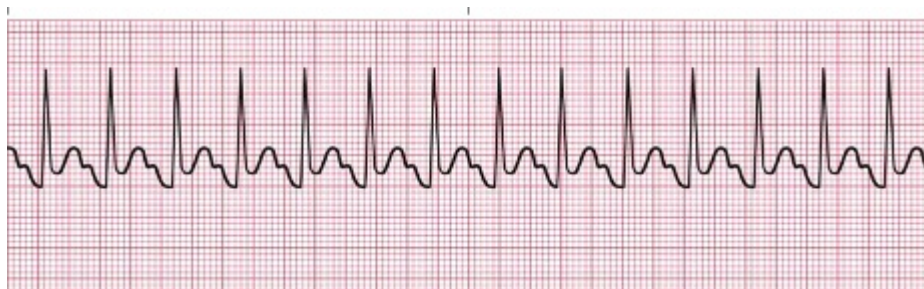


Figure 1. The patient's electrocardiographic monitor strip.

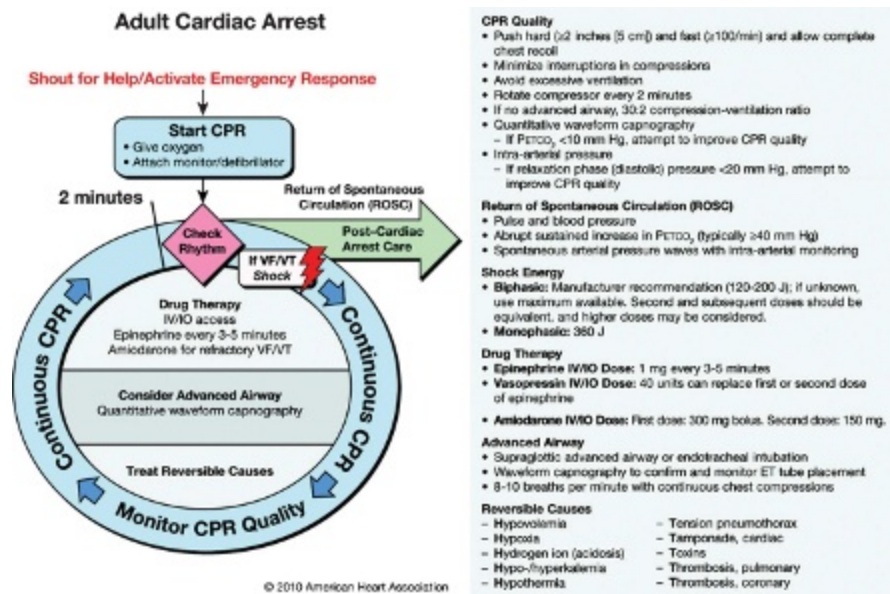


Figure 2. ACLS Cardiac Arrest Circular Algorithm. Reprinted with permission, 2010 American Heart Association. Guidelines for Cardiopulmonary Resuscitation and Emergency, Cardiovascular Care, Part 8: Adult Advanced Cardiovascular Life Support. *Circulation* 2010;122(18 Suppl 3):S729-S767. ©2010 American Heart Association, Inc.

from the 2005 guidelines state that “immediately after the shock, resume CPR. When intravenous access is available, give a vasopressor/antiarrhythmic during CPR. Conduct a rhythm check after 2 minutes of CPR.”³

The concern is that a bolus of vasopressor (epinephrine) or of antiarrhythmic (amiodarone) may be harmful to a patient with a ROSC. Other ACLS providers may have a similar concern and may be withholding drugs until after a rhythm check. Otherwise, all successfully resuscitated patients would receive a drug bolus after defibrillation and before a rhythm check and subsequent pulse check reveals a ROSC.

To explore this possibility, a quality assurance review was undertaken of out-of-hospital resuscitations conducted by Toronto emergency medical service

paramedics (who were updated on the 2005 guidelines in June 2006) involving at least two defibrillations and a ROSC. All such resuscitations between June 2007 and November 2007 were examined. This was an audit of the ambulance call report alone. The results showed that paramedics did not give a drug bolus after a defibrillation but before a documented rhythm check in the great majority of cases. Instead, they checked the rhythm and the pulse and did not administer a drug bolus to patients with a ROSC. This is contrary to the arrest algorithm in their standing orders, adopted from the 2005 guidelines.²

These findings suggest that notwithstanding the recommendation in the 2005 and 2010 ACLS guidelines, providers often do not give bolus drugs during resuscitations without first checking the

rhythm. If most providers are not giving blind drug boluses, these medications are unlikely to be contributing to improved outcomes.

Our quality assurance review raises the question, and future studies need to examine whether bolus drug administration during arrest exposes the patient with unnoticed ROSC to harm. If a provider is unable to interpret the rhythm after defibrillation and during chest compressions or ventilations, a brief pause in CPR may be of benefit before drug administration. If the rhythm suggests the possibility of a ROSC, the bolus drug administration should be held until absence of pulse is determined after the additional 2 minutes of CPR.

ACKNOWLEDGEMENT

I thank Drs. Brian Schwartz and Paul Hawkins for their assistance in viewing the paramedic runs and in reviewing this letter.

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