How Should a "Code Blue" be Managed in the Cath Lab?

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I received an important question about running a code (cardiac arrest and cardiopulmonary resuscitation) in the cath lab from an administrative director of an interventional cath lab without cardiothoracic surgical back up. He wanted to better understand the recommendations of how a Code Blue should be run in the interventional cardiac cath setting.

Question 1: "We ran a 'mock' code in the cath lab the other day and the assumption of the code physician is that the cardiologist needed to allow the code team to take over the situation in the cath lab. Is this correct? [It is often the case that] rather than [requiring] the entire code team, we only need intubation/respiratory help and possibly pharmacy help. If the code has been called in the cath lab, who is in charge?"

Question 2: "Regarding the use of IV lidocaine as a first medication for VT/VF [ventricular tachycardia/ ventricular fibrillation], ACLS [advanced cardiac life support] guidelines state that amiodarone is the drug of choice. What is the standard for the interventional cath lab? I cannot find any consensus statement on following ACLS guidelines in the cath lab during a code as the standard of care for the situations encountered there."

The cath lab and code team interaction

The practice of calling and running a code in the cath lab varies depending on the hospital type, staff composition and experience, and leadership of the cath lab nurses and physicians. The type of assistance brought to a code in the cath lab may also depend on the hospital type and staffing, hospital policy, and whether the code occurs during weekend or off hours.

Rules of engagement for Code Blue

In general, the cardiac catheterization lab is a self-sufficient critical care area. All equipment and drugs are available for complete cardiovascular support and in some labs, even open heart surgery can be performed. Most cath lab nurses are highly skilled at both routine cath patient care as well as critical care. Many have intensive care unit (ICU) backgrounds. The most likely patients who may arrest in the lab are those undergoing interventional procedures commanded by experienced interventional cardiologists. The cath lab is among the best places to save the cardiac arrest patient.

The designated code team leader and who will be in charge must be announced to the cath lab team as they continue to work with the patient still undergoing the procedure.

Cath lab nurses administer critical care drugs, technologists initiate chest compressions, and physicians direct the resuscitation efforts and continue to manage the underlying cause of the cardiac arrest (ischemia, tamponade, pulmonary edema, etc.) Every cath lab has a crash cart, vasopressor and antiarrhythmic drugs, intubation trays, and airway equipment. Rarely is anything else required from outside of the lab. Many of us can recall that in patients with ST-elevation myocardial infarction (STEMI) in shock, the interventional procedure is almost a continuous Code Blue without the code team.

Who's in charge in the cath lab?

The physician performing the procedure is in charge of directing the care of the patient at all times. Whether the patient is experiencing VT/VF or hypotension from tamponade, cardiogenic shock, or hypovolemia (from bleeding or anaphylaxis), the attending cath lab physician calls the shots. However, conventional critical care theory and practice states that the code leader should be responsible for nothing else besides the resuscitation efforts. The cardiologist performing an emergency percutaneous coronary intervention (PCI) on a patient in full arrest may not be the best person to monitor and decide whether and when drugs like lidocaine should be given, cardiopulmonary resuscitation (CPR) held, etc. On the other hand, most cardiologists would never want to be told by a 'code leader' that CPR can't be held for a minute to obtain vascular access, or that CPR efforts should cease. Most now agree that joint decision-making is necessary.

The attending physician may recognize that the best person to intubate his patient is an anesthesiologist or an experienced pulmonary or emergency room physician. When the situation becomes critical and the physician in charge requests more help to manage the patient's airway or chest compression, the quickest way to get this help may be to call a code [unless the lab has already implemented an airway emergency system that activates the anesthesiologist on call for immediate airway help without having to call a full code team to the lab]. The cath lab team will continue to manage the patient while waiting for anesthesia or the emergency room physicians. In the lab, the patient's ventilatory needs can temporarily be managed with bag mask ventilation. Hemodynamic support will be maintained with the administration of ACLS medications and defibrillation as indicated. After intubation, it remains very helpful to have respiratory therapy techs support the airway placement and ventilator management. Respiratory techs are usually key members of most Code Blue teams.

It is my experience and recommendation that upon arrival of the code team in the cath lab, the attending physician should identify the problem to the code team, ask for the appropriate person to help with the problem (usually ventilation), and continue to direct the code. If he cannot attend to all of these aspects,

continued on page 8

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Code Blue

Continued from page 6

he should designate a code leader while he returns to the management of the interventional cardiac procedure. The designated code team leader and who will be in charge must be announced to the cath lab team as they continue to work with the patient still undergoing the procedure.

Who's on the code team?

The composition of code teams varies according to hospital setting and policies. At the minimum, a code team should consist of a physician, nurses, and technicians, particularly the respiratory techs. Some teams also include anesthesia physicians/physician assistants (PAs)/nurse practitioners (NPs), a pharmacist, or other electrocardiogram (ECG) and lab personnel. In smaller hospitals, the code physician may come from the emergency room or be a designated intensive care unit physician. In larger academic medical centers, the code team is run by experienced residents or fellows with rotating assignments as the code physician.

Outside the cath lab on a medical or surgical ward, when a code is called, the resuscitation team arrives and begins CPR, relieving the floor nurses duties of basic life support (BLS) chest compression and breathing and then implementing advanced life support (ALS) actions, continuing compressions, intubating, and giving drugs to manage arrhythmias and any causes of hypotension. Here, the code team physician is in charge. Other physicians may assist the code physician and all of the team operates under the direction of the code physician. The chain of command should be clear and if not, the code team physician often announces who is in charge ("I'm in charge, let's begin…" etc.).

Inside the cath lab, the story is different. As mentioned above, during a cardiac interventional procedure, the cath lab attending physician is in charge. He directs all aspects of care for the patient. Should a VT/VF arrest occur, the cath lab attending physician will direct rapid defibrillation to be performed without delay. As the situation becomes more complicated and if the initial efforts to stabilize the patient fail, the attending may request more help. This is often the case if the patient needs intubation, and the cath physician may be unable to intubate or too occupied with managing the intracardiac wires/stents to perform intubation. In this case, a code is called, bringing the code physicians and others to the cath lab.

In the lab, the cath physician is still in charge and has the option of either running the code or asking the code team physician to take over and direct the code. In either case, the physician in charge must be identified to all participants, who should follow only his lead. This chain of command is critical to prevent the chaos of two captains giving conflicting orders. The choice of roles falls on the attending cath lab physician. In addition, as the code begins, all extraneous personnel and curiosity seekers should be excused from the lab post-haste (i.e., immediately).

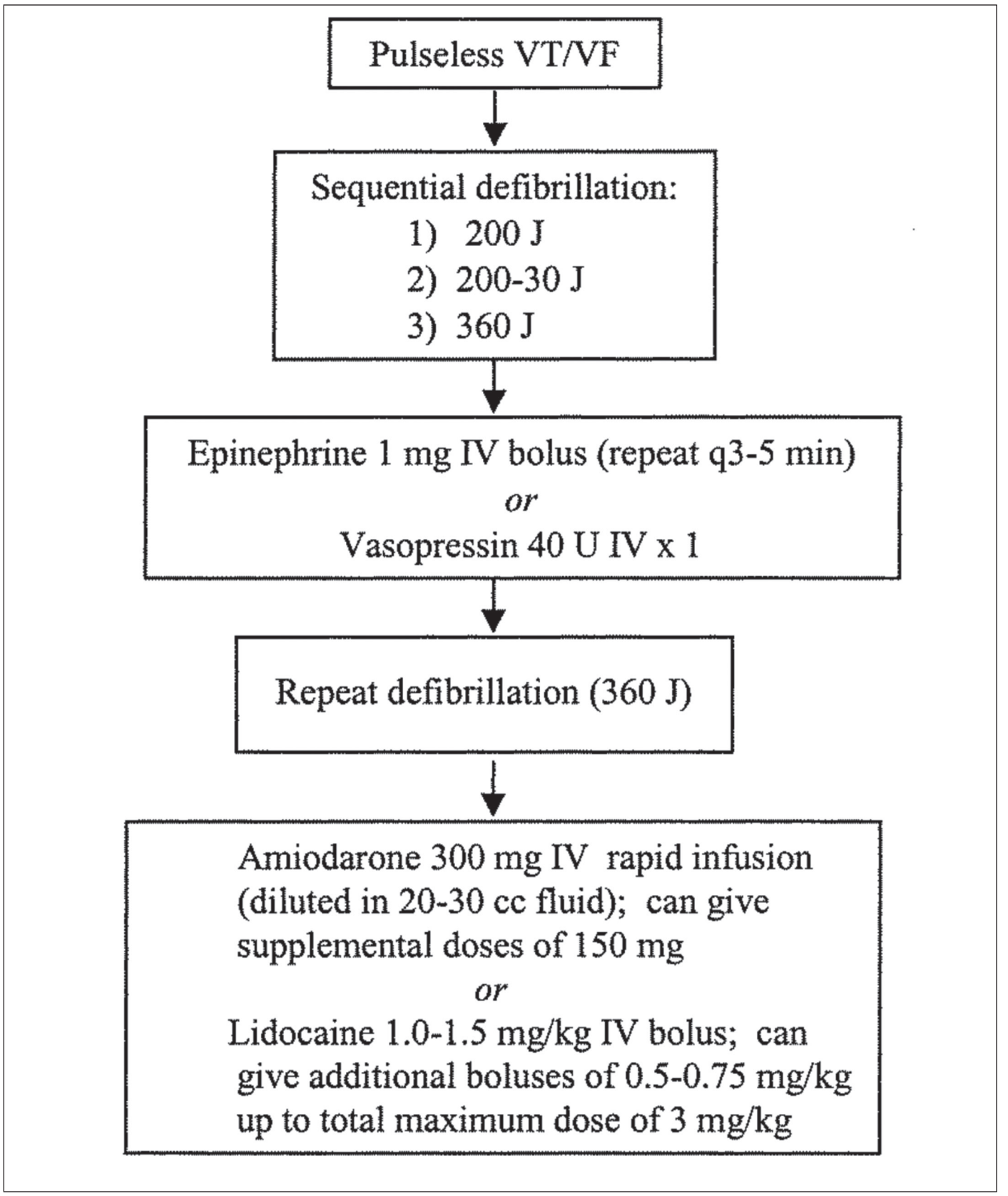

Figure 1. Pulseless VT/VF ACLS algorithm. Reprinted from: *Longnecker CR, Lim MJ. Chapter 8 – High Risk Catheterization. In: The Cardiac Catheterization Handbook. 5th edition. Kern MJ, ed. Elsevier: Philadelphia, Pennsylvania; 2011.*

Communication during a code in the cath lab

As a closing thought, I wanted to emphasize that communication is the key to effective procedures and successful Code Blue results. Once the leader is designated and he issues orders, the nurses carrying out the orders should do what they normally do in the cath lab; that is, acknowledge the order was heard, repeat the order back just before carrying out the order, and announce its completion. Failure to acknowledge and indicate that the order is completed leads to duplicate orders and confusion as someone else may start to act on the same order. In addition, any extraneous conversations must stop. All members of the code team should be 'in the game' and be focused on what their jobs are and how best to carry them out. There is no room for casual chitchat, which distracts from the operations and orders.

The second question that was asked was about the use of lidocaine or amiodarone in the ACLS algorithm. All ACLS medications and algorithms apply equally well inside as they do outside the cath lab. All ACLS drugs should be appropriate for the need of the patient during cardiac resuscitation in the cath lab. Any physicians recommending suboptimal practices should be reminded of current best practices. The ACLS algorithm for pulseless VT/VF in the cath lab indicates amiodarone or lidocaine may be used (Figure 1) (for more detailed information on which drug might be preferred, see Mizzi et al[1]).

I hope this answer to the code blue question helps you understand the roles of the code team when called to the cath lab. ■

Reference

1. Mizzi A, Tran T, Mangar D, Camporesi EM. Amiodarone supplants lidocaine in ACLS and CPR protocols. *Anesthesiol Clin*. 2011 Sep; 29(3): 535-545.