

Until recently, providing ventilation of the lungs by mouth-to-mouth respiration was used if no specific rescue equipment was immediately available (e.g., plastic oropharyngeal airways, esophageal obturators, masked Ambu bag). However, ventilatory support during CPR has yielded to evidence that continuous chest compressions (“hands only” CPR) results in better outcomes. Compressions are interrupted only for single shocks from an AED when available, with 2 min of CPR between each single shock.

#### AUTOMATED EXTERNAL DEFIBRILLATION (AED)

AEDs that are easily used by nonconventional responders, such as nonparamedic firefighters, police officers, ambulance drivers, trained security guards, and minimally trained or untrained laypersons, have been developed. This advance has inserted another level of response into the cardiac arrest paradigm. A number of studies have demonstrated that AED use by nonconventional responders in strategic response systems and public access lay responders can improve cardiac arrest survival rates. The rapidity with which defibrillation/cardioversion is achieved is an important element for successful resuscitation, both for ROSC and for protection of the central nervous system. Chest compressions should be carried out while the defibrillator is being charged. As soon as a diagnosis of VF or VT is established, a biphasic waveform shock of 150–200 J (360 J if a monophasic waveform device is used) should be delivered. If 5 min has elapsed between collapse and first contact with the victim, there is some evidence that 60–90 s of CPR before the first shock may improve probability of survival without neurologic damage. If the initial shock does not successfully revert VT or VF, chest compression at a rate of 100 per minute is resumed for 2 min, and then

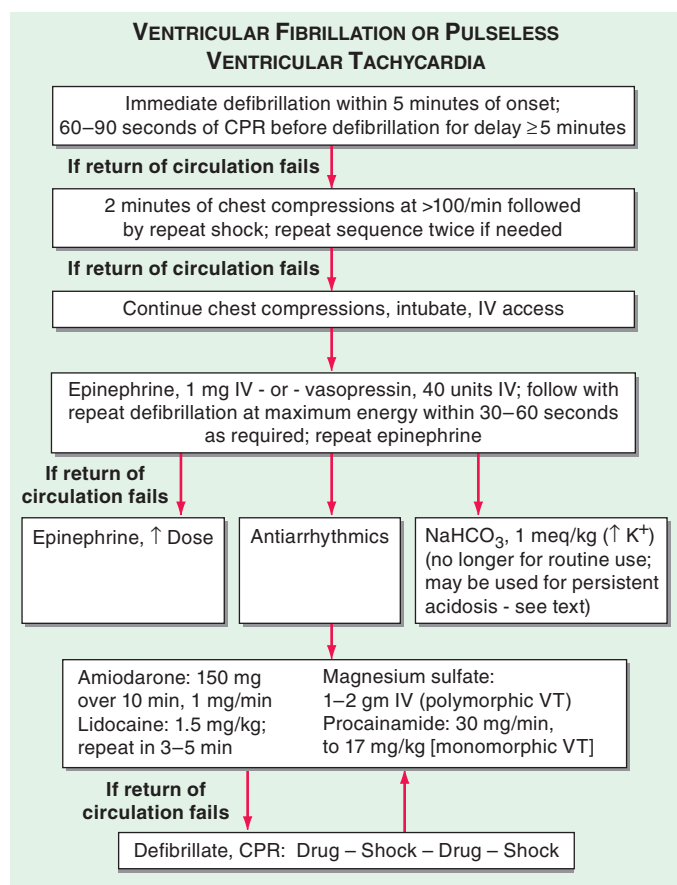
a second shock is delivered. Multiple shocks given in sequence are no longer recommended, in order to minimize interruptions of chest compressions. This sequence is continued until personnel capable of, and equipped for, advanced life support are available, although not much data support the notion that shocks and chest compressions alone will revert VF after three shocks have failed.

#### ADVANCED CARDIAC LIFE SUPPORT (ACLS)

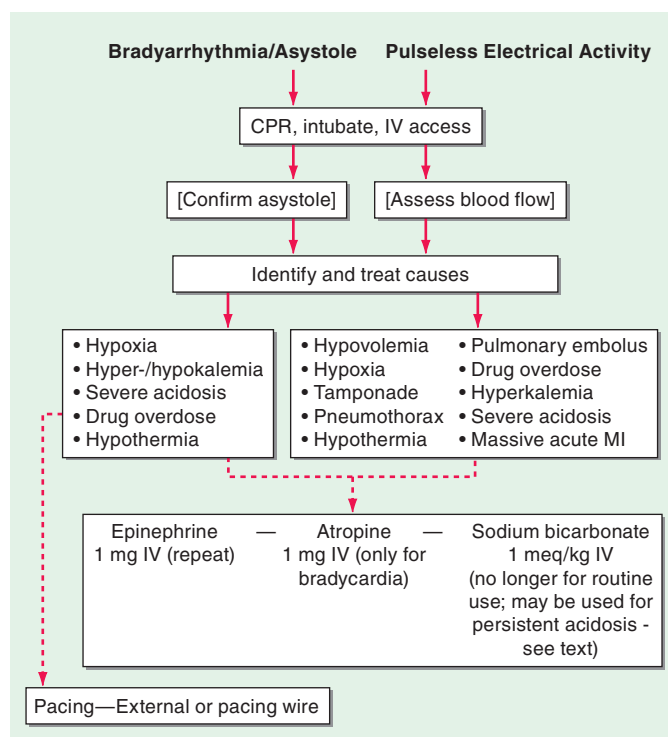
ACLS is intended to achieve and maintain organ perfusion and adequate ventilation, control cardiac arrhythmias, and stabilize blood pressure and cardiac output. The activities carried out to achieve these goals include (1) defibrillation/cardioversion and/or pacing, (2) intubation with an endotracheal tube, and (3) insertion of an intravenous line.

As in basic life support, the major emphasis during ACLS is minimizing interruptions of chest compressions until ROSC is achieved. After two or three unsuccessful defibrillation attempts, epinephrine, 1 mg IV, is given and attempts to defibrillate are repeated. The dose of epinephrine may be repeated after intervals of 3–5 min (Fig. 327-3A). Vasopressin (a single 40-unit dose given IV) has been suggested as an alternative to epinephrine.

If the patient is less than fully conscious upon reversion or if two or three attempts fail, prompt intubation, ventilation, and arterial blood gas analysis should be carried out. Ventilation with O<sub>2</sub> (room air if O<sub>2</sub> is not immediately available) may promptly reverse hypoxemia and acidosis. Quantitative waveform capnography is now recommended for confirmation and monitoring of endotracheal tube placement. A patient who is persistently acidotic after successful defibrillation and intubation or had acidosis prior to arrest, may be



A



B

**FIGURE 327-3** **A.** The algorithm of ventricular fibrillation or pulseless ventricular tachycardia begins with and initial defibrillate on attempt. If a single shock fails to restore a pulse, it is followed by 2 min of cardiopulmonary resuscitation (CPR; chest compressions), followed by another single shock. After three such sequences, epinephrine and then antiarrhythmic drugs are added to the protocol. See text for details. **B.** The algorithms for bradyarrhythmia/asystole (left) or pulseless electrical activity (right) are dominated first by continued life support and a search for reversible causes. Subsequent therapy is nonspecific and is accompanied by a low success rate. See text for details. MI, myocardial infarction; VT, ventricular tachycardia.