New Guidelines of Cerebral Cardiopulmonary Resuscitation by the American Heart Association (2005 - 2006)

John Cook Lane
Universidade Estadual de Campinas, Fundação Centro Médico de Campinas - Campinas, SP - Brazil

Introduction

The author was one of the physicians who introduced modern cardiopulmonary resuscitation in Brazil in the 1960's[1-7], and since then, he has followed the guidelines of the American Heart Association – AHA.

The AHA meets in Dallas, Texas, USA, every five years to update the cardiopulmonary resuscitation guidelines[8,9]. At the last meeting of 281 specialists (141 from the USA and 17 from other countries) in 2004, followed by a new meeting in 2005 with 380 participants, the result was a new international consensus document, published at *Circulation*[8,9].

The aim of this clinical update is to point out the new guidelines for 2005-2006, in relation to the guidelines of the year 2000[8,9].

Compressions and ventilations

• To offer effective chest compressions, it is necessary to push hard and push fast . The chest must be compressed around 100 times per minute in all victims, except newborns.

• The chest must be allowed to return to its normal position after each compression, with an equal time for compression and decompression.

• One should limit the compression interruptions as much as possible, as every time the compressions are interrupted, blood flow ceases.

• Solo lay or professional rescuers should use a 30:2 compression ventilation ratio, or in the case of two lay rescuers.

• Practitioners should use the 15:2 compression-ventilation ratio for two-rescuer CPR. After securing an airway, the synchronization between compressions (around 100 per min) and ventilations (8 to 10 per min) ceases.

• Every five compression-ventilation cycles (around 2 minutes) the rescuers must shift positions, due to the effects of fatigue.

• The emphasis is to offer the patient high-quality basic resuscitation, i.e., open airways, breathing and circulation (ABC). Such has not been practiced in the United States and Canada, where the cardiorespiratory arrest survival, for patients treated outside the hospital, has been 6.4%[8,9].

• High-quality ABC teaching programs associated to the use of Automatic External Defibrillators (AED), using paramedics or police officers located in airports and casinos resulted in an increase of survival between 40% and 70% of the times[8,9].

• Although research has yet to identify the ideal compression-ventilation ratio, it is known that the better the compressions are performed, the better the blood flow to the heart and brain.

• It is recommended that each ventilation last one second and be enough to visibly expand the chest. However, as the blood flow during the ABC procedure is well below the normal, the need for ventilation is also lower than normal.

• A high-pressure ventilation increases the intrathoracic pressure, which, in turn, decreases the blood flow that passes through the chest[8,9].

• Therefore, the hyperventilation is not necessary and can be harmful. Moreover, both mouth-to-mouth and high-pressure mechanical ventilation can cause gastric dilation and potential reflux[8,9].

Defibrillation

• It is believed that many patients in cardiac arrest go through a state of ventricular fibrillation (VF)[8,9].

• Currently, the most effective defibrillators are biphasic, producing exponential truncated waveforms. The first shock eliminates VF in 85% of the times. On average, however, after the VF is eliminated, several minutes are necessary for the heart to return to its normal rhythm; thus, it is recommended not to waste any time in checking whether there is a palpable pulse, but to administrate the ABC of resuscitation for 5 cycles (around two minutes) before checking for the pulse[8,9].

• With a biphasic defibrillator, a 150 to 200-joule (J) shock is recommended. As for monophasic defibrillators (old-fashioned), an initial shock of 360 J is recommended. The emphasis is on the defibrillator use as soon as possible. The survival probability decreases between 7% and 10% for each minute without the ABC and defibrillation[8,9].

Agent administration pathway

• If an intravenous (IV) pathway is taking too long, it is recommended an intraosseous (IO) pathway in adults and children. The pathway is considered safe and effective for the

Key words

Cardiopulmonary resuscitation; guidelines.

Mailing address: John Cook Lane
Rua Cajá 230 - 13094-334 - Campinas, SP - Brazil
E-mail: vanlane@uol.com.br
Manuscript received January 31, 2007; revised manuscript received February 15, 2007; accepted March 7, 2007.

administration of fluids, agents and for blood collection for laboratory assessment, at all ages. The puncture sites include the pretibial region, internal malleolus and iliac crest. The dosage of agents by IO or IV pathways are equivalent[8,9].

• Regarding the endotracheal pathway, it is not known exactly what the ideal dosage of agents is. A lower blood concentration of agents is obtained through this pathway. If used, the recommended dosage is 2 to 2.5-fold the IV or IO dosage[7,8].

• The best pathway to administrate agents is still a central venous line, mainly for long-term access. Nevertheless, this pathway does not result in higher levels of agents or faster action when compared to the peripheral IV administration[8,9].

• All injected agents should be followed by immediate administration of saline solution (5cc), followed by five manual ventilations[8,9].

• In summary, the time spent trying to obtain an IV pathway must be limited to a maximum of three attempts, and then rapidly change to the IO pathway[8,9].

Fluids and agents

When indicated, the fluids are preferably saline or Ringer's solution. A glucose solution must be administrated only when it is a case of proven hypoglycemia[8].

The following agents used during cardiac arrest will be discussed:

• *Adrenaline* - This agent causes vasoconstriction and increases the aortic diastolic pressure, and therefore, the coronary perfusion, a critical factor for a successful resuscitation. The dose is 0.01 mg/kg IV or IO every 3 to 5 minutes. There is no evidence that high doses of adrenaline are indicated[8].

• *Atropine* - Its parasympathetic action accelerates the sinusal sinus and the atrioventricular conduction. The usual dose is 0.02 mg/kg IV or IO, up to a maximum dose of 1 mg in adolescents and 0.5 mg in children[8].

• *Calcium chloride* - The administration of calcium chloride does not result in better outcomes in the treatment of cardiac arrest[8].

• *Sodium bicarbonate* - Its use has not shown to improve survival in cardiac arrest. A higher dose of this agent can cause hypokalemia, hypocalcemia, hypernatremia, hyperosmolarity and decrease the threshold for VF[8].

Conclusion

The current guidelines emphasize their straightforwardness, in order to make them easier to remember.

The emphasis is to offer the patient in cardiac arrest the basic resuscitation (airway, ventilation, compression) with excellence. The defibrillator must be present at the site of the occurrence as soon as possible.

The science of resuscitation is continuously progressing. The AHA will keep on informing the health professionals about modifications in its guidelines, even before the year 2010[8].

References

1. Lane JC. Ressuscitação cardiopulmonar I: respiração boca a boca. Rev Paul Med. 1963; 63: 256-62.
2. Lane JC. Ressuscitação cardiopulmonar II: massagem cardíaca externa. Rev Paul Med. 1963; 64: 326-9.
3. Lane JC, Frazatto C, Geronymo W, Zynger A, Boleiger S. Tratamento da parada cardíaca em fibrilação ventricular sem abertura to tórax. Rev Paul Med. 1966; 68: 99-106.
4. Lane JC. Reanimação cardiorrespiratória externa na comunidade: ensino, erros, complicações e resultados. [Tese Livre-Docência]. Campinas: Universidade Estadual de Campinas; 1974.
5. Lane JC. O início da reanimação cardiorrespiratória cerebral moderna no Brasil. Rev Bras Terap Intens. 2005; 17: 282-4.
6. Lane JC (ed.). Reanimação. Rio de Janeiro: Guanabara Koogan; 1981. 252 p.
7. Lane JC, Albarran-Sotelo R (eds.). Reanimação cardiorrespiratória cerebral. Rio de Janeiro: Medsi; 1993. 478p.
8. 2005 American Heart Association. Guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation. 2005; 112 (22 Suppl): IV-I-IV-211.
9. Currents in emergency cardiovascular care. Highlights of the 2005 American Heart Association Guidelines for Cardiopulmonary Ressuscitation and Emergency Cardiovascular Care. Current in Emergency Cardiovascular Care. 2005-2006; 16: 1-26.