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Review Article

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The Anesthesiologist: A True Expert in Resuscitation of Transoperative Cardiac Arrest

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Abstract

Transoperative cardiac arrest is the sudden and unexpected cessation of cardiorespiratory function that occurs because of the surgical procedure, the patient's disease and the anesthetic procedure. Among the causes of transoperative arrest attributable to anesthesia are hypovolemia, hypoxia and drug overdose. Also included are those related to anesthetic and electro-medical equipment. In addition, those derived from human errors. Timely and effective therapy of cardiorespiratory emergencies in surgical units is an important element. It is the responsibility of the attending physician to have the knowledge and skills that allow the diagnosis and proper treatment of these events. Training and continuous training will ensure that the anesthesiology specialist is a true expert in cardiopulmonary resuscitation.

Keywords: Cardiopulmonary resuscitation; General anesthesia; Regional anesthesia; Transoperative cardiac arrest

Introduction

The sudden and unexpected cessation of cardiorespiratory function that occurs because of a surgical procedure, the patient's disease and the anesthetic drugs and techniques that the anesthesiologist uses in his or her actions is defined as transoperative cardiac arrest. This event has a varied incidence, which ranges between 2.6 and 34.6 per 10 000 patients undergoing anesthesia, with a total mortality at discharge reported internationally between 1.41 and 28.2 per 10 000 procedures. Unemployment directly attributable to anesthesia reaches an incidence of 0.5 to 2.10 cases per 10,000 anesthesia, with a mortality from this cause between 0.12 and 1.4 per 10,000 anesthesia. The frequency of cardiac

arrest in general anesthesia is 5.5 for every 10,000 anesthesia while for regional anesthesia it is 1.5 for every 10,000 anesthesia, demonstrating that the frequency of transoperative cardiac arrest is higher during general anesthesia, this is in relation to numerous High-risk surgeries are performed with this type of anesthesia [1].

Development

The intraoperative arrest has multiple causes, in a study conducted in North America on 518,000 anesthesia, it was found that 35% of stoppages were secondary to intraoperative bleeding, 44% to cardiac causes and 21% responded to other causes. Among them, only 0.5 per 10,000 procedures corresponded to some anesthetic cause. Those attributable to anesthesia are the most important for the anesthesiologist, since his knowledge will allow him to establish prevention measures, accurate diagnosis

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and timely treatment. Among the most important causes are hypovolemia, hypoxia and overdose of anesthetic drugs. In addition, excessive vagal reflex, cardiac arrhythmias, myocardial ischemia, myocardial infarction, pulmonary thromboembolism are included in the etiology of unemployment. The impossibility of intubation and ventilation, laryngospasm and bronchospasm, respiratory depression due to drugs, bronchoaspiration and tension pneumothorax; internal disorders such as hyper and hypokalemia, hyper and hypocalcemia and metabolic acidosis; anaphylactic reactions; problems related to anesthesia and electro-medical equipment such as malfunction, disconnection of circuits and electric shocks. Also included are the causes derived from human errors such as failures in the review of the equipment, inadequate preoperative evaluation of the patients, lack of attention during the anesthetic procedure, fatigue of the professionals, distraction and inexperience [2].

Unemployment can occur at any stage of the anesthetic procedure (induction, maintenance, education, during the transfer to recovery and in the postoperative period). A higher frequency of this has been reported during the education and maintenance of anesthesia. The most frequent rhythm is progressive bradycardia followed by asystole (45%), followed by ventricular tachycardia / ventricular fibrillation (TV / VF) (14%) and pulseless electrical activity (7%) [2].

In the prevention of this complication, the anesthesiologist plays a fundamental role, this should perform a thorough preoperative evaluation, determine the risks for the development of this event and correct them as much as possible before the anesthetic - surgical procedure. Also establish a plan to face clinical events that lead to this situation, ensure adequate monitoring according to the patient's clinical condition and type of intervention, establish the correct dose of anesthetic drugs, adequate circulating volume and oxygenation and early treatment of the bradycardia and progressive tachyarrhythmias.

The diagnosis of transoperative cardiac arrest during general anesthesia is given by the recording on the monitor of the characteristic rhythms such as progressive bradycardia followed by asystole, and ventricular arrhythmias such as TV \rightarrow / VF without central pulse, disappearance of cardiac tones to precordial auscultation, absence of blood pressure registration by non-invasive methods. When invasive blood pressure monitoring is available, a pressure wave flattening can be observed with values between 20 and 40 mmHg. Decrease in oxygen saturation in pulse oximetry and the value of etCO₂ in the capnometry. During regional anesthesia there is sudden deterioration of consciousness, accompanied by the absence of a central pulse and recording on the monitor of the cardiorespiratory events mentioned above [3].

The anesthesiologist plays a primary role in the diagnosis and treatment of this medical emergency, therefore it is who should initiate and conduct cardiopulmonary resuscitation. Due to the multiple factors involved in the genesis of a transoperative arrest, its conduction has special characteristics and its management must be individualized, the PCR performance protocols established by the American Heart Association should not be followed schematically for the patient not surgical [4].

In the event of an established cardiorespiratory arrest, the attending physician must immediately notify the anesthesia team

and the surgical officer of the situation, orient the cessation of the infusion or administration of any anesthetic drug, especially anesthetics halogenated by its potent myocardial depressant effect and perform washing of the reservoir bag and the anesthetic circuit, increase the inspired oxygen fraction and start with cardiopulmonary resuscitation measures, both basic and advanced, with special emphasis on chest compressions and early defibrillation in the case of defibrillable arrhythmias. The role of the precordial stroke in resuscitation continues to be a controversial issue since there is no evidence that its use improves survival, but this can convert sudden ventricular tachycardia to a normal sinus rhythm [5,6].

Simultaneously it is necessary to determine the cause and solve it. In case of unemployment during regional anesthesia, it is essential to establish the airway to optimize ventilation and oxygenation. In neuroaxial blocks, especially when there is an extensive sympathetic block or inadvertent intravascular injection of toxic doses of local anesthetics, it has been recommended that high doses of epinephrine have been beneficial due to the increase in coronary perfusion pressure, which constitutes a determinant important in unemployment survival.

When the restoration of normal cardiorespiratory function is not possible, despite having correctly performed the aforementioned measures, the performance of an emergency thoracotomy for the performance of internal cardiac massage will be assessed with the surgical team, this can also be implemented early in cases of cardiac or thoracoabdominal surgery in which surgical access allows [7].

Intraoperative arrest generally has a good prognosis since it occurs in a perfect setting to establish optimal cardiopulmonary resuscitation. Events are always witnessed, patients are continuously monitored. The venous approach is previously established; the airway and ventilation are controlled or can be easily established. There is immediate availability of defibrillator and drugs useful in resuscitation. There is a human resource trained in the management of this type of crisis. There is also a reduction in metabolism, secondary to the pharmacological action of anesthetics that protects the brain for longer from the consequences of hypoxia and hypoperfusion [8,9].

Causes of resuscitation failure include extreme ages of life, patients with severe chronic diseases (ASA III-IV), extensive and prolonged surgical interventions with large blood losses, in addition, inexperience, lack of training and Anesthesiologists training in this situation[10-12].

Success in resuscitation will depend on a rapid diagnosis, and the correct implementation of life support measures the identification and correction of the triggering cause; as well as the expertise of the anesthesiologist responsible for resuscitation.

Conclusion

The timely and effective therapy of cardiorespiratory emergencies in surgical units is an important element in the protection of all anesthetized patients. It is the responsibility of the attending physician to have the knowledge and skills that allow the diagnosis and proper treatment of these events. Training and continuous training through overcoming courses, seminars and the use of simulators is what will ensure that the anesthesiology

specialist is a true expert in cardiopulmonary resuscitation.

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