International Journal of Scientific Research and Management (IJSRM)
||Volume||10||Issue||12||Pages||MP-2022-764-767||2022||
Website: www.ijsrm.in ISSN (e): 2321-3418
DOI: 10.18535/ijsrm/v10i12.mp03

Intraoperative Cardiac Arrest In The Prone Position In Neurosurgery: A Reel Challenge For The Anesthesiologis

Masad Ilyass[1]*, Abouelalaa Khalil[1], Jaafari Abdelahamid[1] , Mezyane Mohamed[1], Doghmi Naoufal [1] , Elwali Abderrahmane[1], Baite Abdelouahed[1] , Bensghir Mustapha[2] .

1 Department of Anesthesiology and Intensive Care, Military Hospital Mohammed V, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University, Rabat, Morocco
2 Department of Anesthesiology And Intensive Care, head of anesthesiology of The Mohamed V Military Training Hospital, Faculty of Medicine And Pharmacy of Rabat, Mohammed V University, Rabat, Morocco

*Corresponding author: MASAD Ilyass, Department of Anesthesiology and Intensive Care, Military Hospital Mohammed V, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University, Rabat, Morocco

Abstract
The Cardiac Arrest in Elective Neurosurgery, is complex and different from other types, as it's influenced by the patient's position, the surgical procedure, and the equipment used to fix the skull;
we report a case of a patient admitted for lumbar spine surgery in prone position who presented an intraoperative cardiac arrest.
chest compressions can be started immediately for prone patients; some studies confirmed the efficacy of back compressions but patients should be turned supine if possible.
When defibrillation were necessary in patients ventilated in the prone position, defibrillation should be attempted, as placing the patient in the supine position would take precious minutes and would reduce the chances of successful defibrillation. Evidence is rare when dealing with neurosurgical patients, and more efforts are needed in understanding the etiologies, mechanisms and the specificities of its management.

Keywords: Cardiac arrest, Prone position , Neurosurgery, Cardio pulmonary resuscitation.

Introduction

Cardiac arrest is a rare but dreaded intraoperative complication with an incidence of 1.1 to 7.2 per 10,000 anesthetics[1]
The Cardiac Arrest in Elective Neurosurgery, is complex and different from other types, as it's influenced by the patient's position, the surgical procedure, and the equipment used to fix the skull [2]
we report a case of a patient admitted for lumbar spine surgery in prone position who presented an intraoperative cardiac arrest.

Observation

A 65-year-old man, weighing 67 kg and measuring 170 cm in height, suffering from chronic low back pain with heainess of the lower limbs, was scheduled for an L3-L5 narrow lumbar canal.

The preoperative anesthetic evaluation anaesthesia, found a notion of hypertension with poor therapeutic compliance,as well as dyspnea on effort.The patient was classified ASA II at the end of the preanesthetic evaluation.

The preoperative blood workup complete blood count, ionogram, blood sugar, urea creatine .The electrocardiographic tracing showed a normal sinus rhythm.

A standard general anaesthesia was proposed, with routine monitoring (electrocardiogram, non-invasive blood pressure, pulse oximetry and capnography).

On the day of surgery the patient was admitted to the operating room.The induction of anesthesia was performed with titrated doses of propofol, and the curarization was achieved using 50 mg of rocuronium. Fentanyl 200 microgram intravenously was administered for analgesia.
Maintenance of anesthesia was performed using an oxygen/air mixture and sevoflurane. Volume-controlled ventilation mode was used intraoperatively, and a carbon dioxide target of 32-35 mm Hg was maintained. maintained. After the patient was anesthetized and intubated and artificial respiration was set, the patient was placed in the genupectoral position with a pillow under the chest, abdomen free.
Vital hemodynamic parameters remained stable and surgery could begin. In the middle of the operation, a bradycardia suddenly appeared (the heart rate suddenly dropped to a minimum value of 35 beats per minute) which was associated with a simultaneous drop in blood pressure (60/32 mm Hg),a few seconds later asystoli
.
the surgical stimulus was stopped, We immediately started the chest compression in prone position, 100 ug of Epinephrine was delivred and the patient recovered to sinus rhythm at a rate of 70 bpm approximately 2 min after the start of the chest compressions. After recovery of sinus rhythm, ECG did not show noticeable abnormalities. Analysisof arterial blood gases showed pH 7.38, PaCO2 of 42 mmHg, PaO2 of 250 mmHg, ionogram revealed normal kalemia.
At the end of the operation, no abnormalities were described in the ECG and laboratory tests. the heart rate and blood pressure returned to their normal values.
The patient had no other postoperative event and was admitted to intensive care for postoperative care. The patient was extubated after full recovery.

Discussion

Perioperative Cardiac Arrest is a rare form of intrahospital cardiac arrest (IHCA) as it only constitutes 2%, and studies about these forms are very limited [3] [4].

To this date, it is difficult to find strong and multicentric evidence about the Perioperative Cardiac Arrest in Neurosurgery, However, a literature review showed that this event is special and its managements should be adapted to the aetiology [5].

A systematic review by M.Kwee at al. showed that the prone position during surgery is associated with physiological changes with a decrease in stroke volume, cardiac index. This can even lead to cardiovascular severe adverse events and even asystole, if associated with other risk factors like Cardiac comorbidities, Hemorrhage [6].

Prone, Lateral, Concorde and other specific positions are not adapted to the normal chest compressions nor the defibrillation. Even if most cardiac events are momentaneous and resolving, patients requiring proper cardio pulmonary resuscitation (CPR) will need considerable effort to be turned to supine position. CPR is well codified in supine position [7].

Since 2005, AHA guidelines for CPR recommend that prone CPR may be reasonable when the patient cannot be returned to the supine position without harm, particularly in patients hospitalized under artificial ventilation[8].

The positioning should also be assessed by the operating team , and repositioning the
patients is necessary if the current position doesn't allow effective and quality
chest compressions.
If position is supine, Chest compressions can start immediately, with an emphasis to release the head fixation. Continuing chest compression with a fixed skull, can cause serious damage to scalp injury and spine.
If position is Lateral, the operating team should turn the patient supine for optimal CPR, even if chest compressions were described in lateral position but their efficiency is unknown.

In the sitting position, chest compressions will be difficult to execute, thus placing the patient in supine is recommended.

On the other hand, chest compressions can be started immediately for prone patients; some studies confirmed the efficacy of back compressions but patients should be turned supine if possible [9].

However, the new guidelines place more emphasis on methods to ensure high quality CPR by setting targets for frequency and depth of compressions, as well as minimum values obtained from monitoring devices such as capnography and continuous arterial line.There are no specific recommendations for the frequency and depth of compressions for the prone patient. In addition to the recommendations given to the supine patient.

in our case, the frequency was mainly above 100 frequency was primarily greater than 100 compressions/minute and the depth was sufficient depth to produce good perfusion indicators, but without generating instability between the generate instability between the thoracic and cervical spine, which was fixed by the Manfield head support.

As shown by CT scans in normal healthy patients, the anatomical structures of the precordial region reduce the effectiveness of cardiac massage in supine patients.

Direct contact between the sternum and the bed is dampened by the flattened shape of the anterior ribcage, subcutaneous fat, chest, and pectoral muscles.

With a fist between the sternum and the bed, the compressive force applied from the back is more likely to concentrate pressure on the sternum , without the fist under the precordium, the contact area would be much larger and therefore a lower compression pressure would be produced.

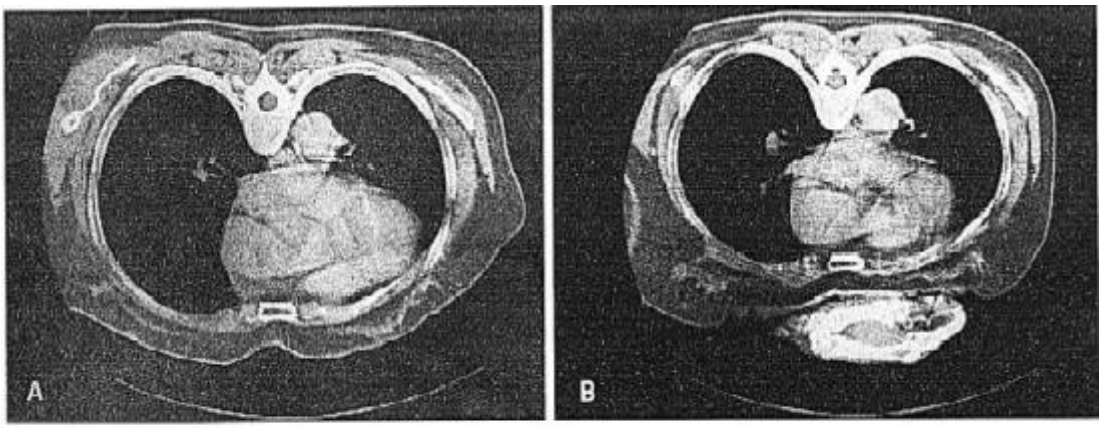

FIG. 1. Computerized tomographic (CT) scan of a woman's thoracic cage at T4 level in prone position. *A:* Contact area between chest and the bed is diffuse. Subcutaneous fat, breast, and pectoralis muscle are interposed between thoracic cage and the bed. The woman lies on a mattress, which is shaped by the curvature of a CT scan bed. *B:* With a fist under the sternum, contact area between the sternum and the bed is reduced. Both the metacarpal bones and the proximal phalanges of ring finger and index finger are also shown.

Figure 1: Chest CT scan showing the prone cardiac massage technique [9].

The advantages of prone cardiac massage are the speed with which it can be with which it can be initiated and the possibility of avoiding contamination of the surgical contamination of the surgical site or generate trauma to the surgical site that could occur when a patient is hastily turned to the supine position.

Miranda et al described a case in which electrical defibrillation was successfully performed in the prone position in a patient undergoing complex spinal surgery. They suggest that, if defibrillation were necessary in patients ventilated in the prone position, defibrillation should be attempted, as placing the patient in the supine position would take precious minutes and would reduce the chances of successful defibrillation [10].

The Main difference with conventional ACLS is the initial dose of Epinephrine. The aim is to decrease the risk of rebound hypertension by giving minimal epinephrine dose (50-100 ug) instead of the conventional 1mg [11].

Conclusion

Evidence is rare when dealing with neurosurgical patients, and more efforts are needed in understanding the etiologies, mechanisms and the specificities of its management.
Elaboration of specific guidelines, promoting research and implementing adverse events and anesthesia clinical outcomes registry can be a great step to enhance patients outcome after these severe events.

References

1. Li G., « Intraoperative cardiac arrests in adults undergoing noncardiac surgery: incidence, risk factors, and survival outcome. », *Anaesthesiology*, p. 1018-1026, 2012.
2. Chowdhury T, Prabhakar H, Bithal PK, Schaller B, Dash HH. Immediate postoperative complications in transsphenoidal pituitary surgery: A prospective study. Saudi J Anaesth. 2014 Jul;8(3):335–41.
3. Peberdy MA, Kaye W, Ornato JP, Larkin GL, Nadkarni V, Mancini ME, et al. Cardiopulmonary resuscitation of adults in the hospital: A report of 14 720 cardiac arrests from the National Registry of Cardiopulmonary Resuscitation. Resuscitation. 2003 Sep 1;58(3):297– 308.
4. Ramachandran SK, Mhyre J, Kheterpal S, Christensen RE, Tallman K, Morris M, et al. Predictors of Survival from Perioperative Cardiopulmonary ArrestsA Retrospective Analysis of 2,524 Events from the Get With The Guidelines-Resuscitation Registry. Anesthesiology. 2013 Dec 1;119(6):1322–39.
5. Cardiac Emergencies in Neurosurgical Patients [Internet]. [cited 2020 Sep 21]. Available from: https://www.hindawi.com/journals/bmri/2015/751320/
6. Kwee MM, Ho Y-H, Rozen WM. The Prone Position During Surgery and its Complications: A Systematic Review and Evidence-Based Guidelines. Int Surg. 2015 Feb;100(2):292–303.
7. Anez C, Becerra-Bolanos A, Vives-Lopez A, Rodriguez-Perez A. Cardiopulmonary Resuscitation in the Prone Position in the Operating Room or in the Intensive Care Unit: A Systematic Review. Anesth Analg. 2021 Feb;132(2):285–92.
8. « 2005 American Heart As- sociation Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care ».
9. Wei J, Tung D, Sue S-H, Wu S-V, Chuang Y-C, Chang C-Y. Cardiopulmonary resuscitation in prone position: a simplified method for outpatients. J Chin Med Assoc JCMA. 2006 May;69(5):202–6.
10. D. C. N. C. C. Miranda, « Successful Defibrilla- tion in the Prone Position », *British Journal of Anaesthesia*, p. 937-938, 2000.
11. « Resuscitation Council (UK). Resuscitation Guidelines 2010. » www.resus.org.uk/pages/guide.htm.