AUCTORES
Globalize your Research

Journal of Clinical Cardiology and Cardiovascular Interventions
Modibo Doumbia

Open Access

Case Report

The first case of circulatory arrest in deep hypothermia in cardiac surgery in Mali

Modibo Doumbia[1*], Baba Ibrahima Diarra[1], Thierry Langanay[4] Bréhima Coulibaly[1,2], Asmaou keita[1,2], Mahamadoun Coulibaly[1,2], Siriman Koita[1], Sanoussy Daffe[1], Mamadou K Toure[1], Seydina Alioune Beye[2,3], Erwan Flecher[4], Mamadou B Diarra[1,2,3]

[1]Center cardio-pédiatric André Festoc de Bamako- Mali
[2]Faculty Médicine and Odonto-stomatologist of Mali
[3]University sciences technic and technologist of Bamako- Mali
[4]Faculty Médicine and Odonto-stomatologist of Reine and France

***Corresponding author:** Modibo Doumbia, surgeon cardiovascular and thoracic, MALI

Received date: September 05, 2020; **Accepted date:** October 30, 2020; **Published date:** November 04, 2020

Citation: Doumbia M., Baba I. Diarra., Langanay T., Coulibaly B, Keita A, et al., (2020) The first case of circulatory arrest in deep hypothermia in cardiac surgery in Mali. *J, Clinical Cardiology and Cardiovascular Interventions*, 3(9); **Doi**:10.31579/2641-0419/079

Abstract

The authors report the case of circulatory arrest in deep hypothermia during the closure of an arterial duct associated with significant mitral insufficiency for mitral replacement in an underdeveloped country such as Mali. This circulatory arrest technique used in major European and American heart surgery centers for the management of complex heart disease. It constitutes a real challenge for us to report the first case of circulatory arrest in the management of the persistent arterial canal associated with mitral insufficiency including simple operative consequences.

Key Words: arterial canal, circulatory arrest, surgery cardiac, Mali

Introduction

The use of circulatory arrest in deep hypothermia in aortic arch surgery was reported in the 1960s, but it was not until 1975 that Griepp et al. demonstrated the safety and operational benefit of this technique in the West [1,2]. Circulatory arrest in deep hypothermia is a technique used in certain cardiac and vascular surgeries, in order to combine optimal operating conditions and brain protection in developed countries. Deep hypothermia is the method used for brain protection but the majority of patients tolerate 30 minutes of circulatory arrest at 18 ° C without significant neurological damage [1,2]. The indications for circulatory arrest in deep hypothermia in cardiac surgery are: aortic surgery, pulmonary thromboendarterectomy and complex congenital heart disease surgery [3]. Our observation reports the first circulatory arrest in deep hypothermia during the closure of an arterial canal associated with mitral insufficiency under extracorporeal circulation in the André Festoc Cardio-Pediatric Center in Bamako, Mali.

Case presentation:

O K 23 years old with no known medical and surgical history followed for 4 years for severe mitral insufficiency associated with a persistent arterial duct.

The physical examination found a good general condition with colored conjunctiva, no peripheral signs of cardiac congestion and a BMI = 19.2 kg / m2. The heart is irregular with a systolic murmur at the mitral focus and a burst of B2 at the pulmonary focus. The lungs are free. The abdomen is flexible with no palpable mass. The rest of the exam is unremarkable. The chest x-ray found cardiomegaly with a CT: 0.72 and a bulge in the middle arc. The electrocardiogram found a regular sinus rhythm with a complete right branch block and left ventricular enlargement. The echo-heart found a massive mitral insufficiency by lack of coaptation by restriction and calcified of small mitral valve then an arterial channel of 8 mm with a bidirectional shunt then a systematic pulmonary arterial pressure at 68mmHg. Biology was normal. The ENT and stomatology consultation did not find any infectious focus. The indication of a mitral valve replacement and a closure of the arterial canal were posed and carried out under an extracorporeal circulation (ECC) in normothermia. During the closure of the arterial canal we decided to make a circulatory arrest in deep hypothermia because the closure was difficult. We performed a circulatory arrest in deep hypothermia at 18 ° C with an ice pack on the head and then on the neck. This circulatory arrest allowed us to close the arterial canal for 18 min. He underwent mitral valve replacement with a mechanical prosthesis via the Sondergaard route under extracorporeal circulation in normothermia. The immediate aftercare was simple.

Discussion

The first case of hypothermia as a therapeutic intervention dates back to the Hippocratic era, of the Hippocratic School of Medicine, where it was described as a treatment for tetanus [1,2]. Dillard et al. performed TAPVC corrections using deep hypothermic circulatory arrest in 1967. This technique is commonly used in American, European and Asian Cardiac Surgery Centers [4]. However, this technique was implemented for the first time at the André Festoc cardio-pediatric center by Doctor Thierry Langanay during a humanitarian mission organized by the Chaine de l'Espoir association. There is not enough literature on the use of circulatory arrest in deep hypothermia in the correction of congenital heart disease reported by cardiac surgery centers in West Africa. [4, 5]. This first case demonstrates the feasibility of this technique in countries with limited resources like Mali. We did not use any specific premedication. Although the use of corticosteroids (6 to 8 h before surgery) can decrease the release of inflammatory cytokines and prevent lysosomal degradation during hypothermia [3,4]

In the literature, the use of circulatory arrest in deep hypothermia requires modifications to the standard circuit of the extracorporeal circulation. The use of a magnetic centrifugal pump is preferred to the roller pump. It maintains the number of leukocytes and preserves the platelet function. In our case we used the standard circuit with the roller pump. Neurological surveillance is commonly used in many centers in the West [6]. However, our center does not have a brain monitoring device. In many centers, the duration of brain protection during circulatory arrest in deep hypothermia is extended by the use of a retrograde cerebral perfusion or a selective anterograde cerebral perfusion. These two techniques increase the complexity of the surgery, but they make it possible to work in lighter hypothermic conditions (22-25 ◦C) without compromising the brain protection time [6]. Whatever the technique used, there are two categories of neurological damage: transient neurological dysfunctions and irreversible ischemic brain damage (stroke). Transient dysfunctions (28.1%) manifest as episodes of confusion, agitation, delirium, memory loss and seizures and its abnormalities normalize in ten to 14 days. Persistent neurological deficits are associated with circulatory arrest exceeding 25 minutes. The risk of irreversible neurological damage varies from 1.8 to 13.6%. Unlike transient lesions, these deficits are visible in cerebral computed tomography. Focal neurological deficits are often linked to emboli in the intraoperative phase [7,8].

Conclusion

The use of circulatory arrest in deep hypothermia is essential to perform certain surgical procedures in countries with limited resources, such as persistent ductus arteriosus. this technique, performed for the first time in Mali, was a success for our service and the closure of the ductus arteriosus can cause circulatory arrest in deep hypothermia to facilitate the development of certain congenital heart disease.

Declaration of interests

The authors declare that they have no conflicts of interest.

References

1. Rimmer L, Fok M, Bashir M. The History of Deep Hypothermic Circulatory Arrest in Thoracic Aortic Surgery. Aorta. 2014; 2(4):129.

2. Arrowsmith JE, Hogue CW. Deep hypothermic circulatory arrest. In: Ghosh S, Falter F, Cook D, editors. Cardiopulmonary bypass. Cambridge: University Press; 2009. p. 125—139.

3. Svyatets M, Tolani K, Zhang M, Tulman G, Charchaflieh J. Review articles. Perioperative management of deep hypothermic circulatory arrest. J Cardiothorac Vasc Anesth2010;24(4):644—655.

4. Nwiloh JO, Oludara MA, Adebola PA. Heart surgery practice in Sub Saharan Africa: single Nigerian institutional midterm results and challenges. World Journal of Cardiovascular Surgery. 2014; 4 (03): 35.

5. Stecker MM, Cheung AT, Pochettino A, Kent GP, Patterson T,Weiss SJ, et al. Deep hypothermic circulatory arrest: I. Effects of cooling on electroencephalogram and evoked potentials. Ann Thorac Surg 2001;71(1):14—21.

6. Khaladj N, Shrestha M, Meck S, Peterss S, Kamiya H,Kallenbach K, et al. Hypothermic circulatory arrest with selective antegrade cerebral perfusion in ascending aortic and aortic arch surgery: a risk factor analysis for adverse outcome in 501 patients. J Thorac Cardiovasc Surg 2008;135: 908—914.

7. Stier G, Verde EW. The postoperative care of adult patients exposed to deep hypothermic circulatory arrest. Semin Cardiothorac Vasc Anesth 2007;11(1):77—85.

8. Stier G, Verde EW. The postoperative care of adult patients exposed to deep hypothermic circulatory arrest. Semin Cardiothorac Vasc Anesth 2007;11(1):77—85.

DOI:10.31579/2641-0419/079