Journal of the Egyptian Society of Cardio-Thoracic Surgery 25 (2017) 337–342

HOSTED BY

Contents lists available at ScienceDirect

Journal of the Egyptian Society of Cardio-Thoracic Surgery

journal homepage: http://www.journals.elsevier.com/journal-of-the-egyptian-society-of-cardio-thoracic-surgery/

Prophylactic amiodarone in patients with severe aortic stenosis and left ventricular hypertrophy undergoing aortic valve replacement: Silencing the rebels

Mohammed Abd Al Jawad [a,*], Mohammed S. Shorbagy [b], Mohammed Saleh [b]

[a] Department of Cardio-thoracic Surgery, Ain Shams University, Cairo, Egypt
[b] Department of Anesthesiology, Ain Shams University, Abbaseya Square, Cairo, Egypt

ARTICLE INFO

Article history:
Received 27 September 2017
Accepted 2 December 2017
Available online 5 December 2017

Keywords:
Amiodarone
Refractory VF
Reperfusion injury

ABSTRACT

Background: Ventricular fibrillation occurs commonly after aortic cross clamp in patients undergoing aortic valve replacement for severe aortic stenosis. Amiodarone is a class III antiarrhythmic drug that can be used as a prophylactic measure to prevent reperfusion ventricular fibrillation as ventricular fibrillation increases myocardial oxygen demand and hence myocardial damage.

Methods: A prospective, randomized, triple blinded study conducted in a single institution, Cardio-thoracic Academy, Ain −Shams University, Cairo, Egypt.120 patients with severe AS enrolled for elective aortic valve replacement. 60 patients received 10 ml of normal saline 9% (control group), while the other 60 patients received a single dose of Amiodarone 150 mg in 10 ml of Dextrose 5% through the pump circuit (Case Group). The incidence of post clamp arrhythmia, need of defibrillation, cardiac support was recorded.

Results: 36 patients (60%) of the case group had spontaneous sinus rhythm upon declamping which is significantly lower than control group. The incidence of VF was lower in the case group (P value < 0.001) (highly significant). The number of DC shock required for ventricular defibrillation, total bypass and declamping times were significantly lower in the case group.

Conclusions: Prophylactic use of a single dose amiodarone through the pump circuit before cross clamp release reduces the incidence of reperfusion induced ventricular fibrillation and subsequent defibrillation therapy needed.

1. Introduction

Aortic stenosis is gaining a lot of attention worldwide as it is becoming the most common primary valve disease in the western hemisphere, which is leading to invasive intervention either surgically based or catheter based [1].

Egypt is no different with a growing prevalence of AS due to the ageing population [2].

* Corresponding author. Department of Cardio-thoracic Surgery, Ain Shams University, Abbaseya Square, Cairo, Egypt.
E-mail addresses: mohammed_abdaljawad@med.asu.edu.eg (M.A. Al Jawad), dr.mohammedelshorbagy@gmail.com (M.S. Shorbagy), dsalehm2002@hotmail.com (M. Saleh).

Peer review under responsibility of The Egyptian Society of Cardio-thoracic Surgery.

https://doi.org/10.1016/j.jescts.2017.12.001

As severe aortic stenosis represents a challenging afterload to the myocardium causing a pathophysiologic adaptation in the form of left ventricular hypertrophy (LVH), which is an independent risk factor for upcoming cardiac events ranging from abnormal increase in oxygen demand, arrhythmia and up to sudden death [3].

Ischemia reperfusion (I-R) injury impairs myocardial recovery after aortic cross clamping (ACC) during open-heart operations. There is no doubt that the benefit of reperfusion can cause serious arrhythmias, myovascular damage, new necrosis, mechanical stunning, and low cardiac output (CO) syndrome after cardiopulmonary bypass (CPB) [4,5].

Ventricular fibrillation (VF) following aortic valve replacement is a common undesirable event especially if it is continuing during the rewarming phase following aortic cross clamp removal with its toll of increased myocardial oxygen demand. Most common causes of persistent VF during CPB include reperfusion injury, ischemic damage, inadequate myocardial preservation, inadequate deairing, electrolyte imbalance and/or unattended hypothermia [6].

Amiodarone is class III antiarrhythmic drug, widely used in treatment of refractory arrhythmia especially ventricular tachycardia (VT), ventricular fibrillation (VF) and wide complex tachycardia, all are associated with the incriminating LVH ECG [3,7].

While use of Lidocaine to treat ventricular fibrillation during CPB, no enough data is available demonstrating the efficiency of a single dose 150 mg Amiodarone through the pump circuit to suppress the refractory VF (RVF) after the release of cross clamp [8].

At this study, we aimed to draw the attention to the effect of a single dose amiodarone on refractory ventricular fibrillation following aortic cross clamp removal in patients with severe aortic valve stenosis and left ventricular hypertrophy undergoing aortic valve replacement.

2. Patients and methods

After gaining the approval of the medical ethical committee of Ain Shams University, a triple blinded prospective randomized study was conducted over 120 patients, aged from 40 to 70 years old, ASA physical status I and II, NYHA class II-III scheduled for elective aortic valve replacement only were enrolled in the study. A written informed approval/consent was collected from all the candidates. This study was carried out in Cardio-thoracic Academy, Ain −Shams University, Cairo, Egypt, between July 2014 and July 2017.

We only included patients with High-gradient aortic stenosis (valve area <1 cm^2, mean gradient >40 mmHg), while other types of aortic stenosis were excluded. And as an institution protocol all patients above 40 years old had a preoperative coronary angiography to exclude any coronary abnormality.

Patients undergoing any cardiac surgical procedure rather than AVR, patients with any comorbidity like Diabetic, renal, respiratory and neurological disorders were excluded, patients with abnormal preoperative cardiac rhythm documented by ECG or on regular anti arrhythmic drugs or neuropsychiatric drugs eg. Phenytoin were excluded.

Anesthetics techniques were unified in all patients, standard monitoring pulse oximetry, lead II and V5 of ECG, automated ST segment trend analysis, Central venous pressure (CVP) catheter, end tidal capnography, nasopharyngeal temperature and urine monitoring.

Smooth balanced anesthesia with Fentanyl 2–5 μg/kg, Propofol 1–2 mg/kg, Pancuronium 0.1 mg/kg and inhaled isoflurane 0.5–1% were administered. Patients were mechanically ventilated to keep ETco2 between 30 and 35 mmHg.Serial blood gases and serum electrolyte analysis were done with tight control of blood sugar to be ≤200 mg/dl.

Surgical techniques were conducted by one surgical team. all patients were operated through standardized median sternotomy incision in supine position. Systemic heparinization was established at a dose of 300 IU/kg after gaining access to the heart and pericardial suspension was done.3 purse string sutures were made at the highest point of the ascending aorta just before take-off of the innominate artery, aortic cannulation was established. after which right atrial cannulation was completed by a two-stage venous cannula according to patient weight and body surface area. A left ventricular vent was used through means of right superior pulmonary vein. after commencing cardiopulmonary bypass and achieving a moderate hypothermia state (28°C-32 °C); aortic cross clamp was applied and intermittent, cold, anterograde blood enriched cardioplegia was given. Half dose of cardioplegia was repeated every 20 min as needed. Topical cooling was also used to properly preserve the myocardium.

The ascending aorta was mobilized from the pulmonary trunk, sinotubular junction well identified and a transverse aortotomy is done with extension of the incision into the non-coronary sinus of Valsalva. Proper inspection of the valve, coronary ostia and LVOT was done and followed by excision of the valve in regular manner. Proper debridement for any annular calcification with avoidance of unnecessary manipulation at the right-non coronary commissure. Sizing was done and proper bileaflet mechanical prosthesis was selected from St Jude Medical (SJM) Regent (St Jude Medical, St Paul, Minnesota, USA) valves using the 2/0 Ethibond everting sutures with Teflon pledgets. All valves were implanted in the supraanular position.

Closure of the aortotomy using 4/0 poly propylene sutures in two layers, during which rewarming is started. Meticulous deairing is done through the aortic root cannula and under TEE guidance.

During rewarming phase and 3 min prior to cross clamp removal and by method of closed envelopes, 60 patients received 10 ml of normal saline 9% through the pump circuit (Control), while the other 60 patients received a single dose of Amiodarone 150 mg in 10 ml of Dextrose 5% (Case). As per surgical team preference all patients received 5 ml of 2% Lidocaine (100 mg) and Mg.