

UNIVERSITY OF MEDICINE AND PHARMACY OF TÎRGU MUREŞ

DOCTORAL SCHOOL

PhD Thesis

ARRHYTHMIAS AFTER CARDIAC SURGERY

PhD Student: Mathe Zsombor

Scientific Advisor: Prof. Dr. Incze Alexandru

Abstract

Postoperative arrhythmias are frequent in patients who underwent cardiac surgery and they increase significantly the postoperative mortality and morbidity. Arrhythmias may also be present in the healthy population. They can cause hemodynamic instability right after cardiac surgery. The causes of arrhythmias may be psychological stress, smoking, alcoholism, antitusive and antitlu medication, some stimulants that contain caffeine; pathologies which affect the pumping function of the heart, like the ischaemic diseases, arterial hypertension and valvular diseases; or they may be idiopathic. Other causes may be the age, and the weakening of the heart, other diseases, medications.

Postoperative arrhythmias in cardiac surgery may appear sooner or later in the recovery stage after surgery. The underlaying cause may be the lesion of the intrinsic nervous system of the heart. These may cause severe hemodynamic instability and they increase the hospitalisation period.

In some cases, like patients with multi vessel diseases, the coronary artery by-pass grafting (CABG) is the gold standard in the treatment of ischaemic heart disease. Other group of diseases which frequently are treated by surgical intervention is the group of valvular diseases. Nowadays, the most frequent technique in cardiac surgery is the one which uses the extracorporeal circulation. The primary objective of CABG is the by-pass of the stenosis, by using the internal thoracic artery, saphenous vein, radial artery or the left gastroepiploic artery.

The novo atrial fibrillation is more frequent in patients who underwent myocardial revascularisation for the first time.

The very early inflammatory stage that follows CABG surgery has been incriminated in the occurrence of many post-CABG complications.

However, it remains unclear how much of the inflammatory response that occurs in the very early post-CABG phase reflects the amount of trauma caused by the surgical procedure and how much of it is actually due to concomitant confounding factors such as administration of protamine, of blood, complement system activation by the contact of blood with the surface of the extracorporeal circuit, or acute lesions due to electrical defibrillation. We aimed to assess whether the previously reported impact of the duration of CABG on postoperative inflammatory markers levels is maintained beyond the very early post-CABG phase and to investigate whether the magnitude of this after CABG inflammatory response contributes to patients' in-hospital, postoperative outcomes.

For the first study, i.e. the retrospective study we used the medical records database from Cardiac Surgery Clinic, Institute of Cardiovascular Diseases and Transplantation, Tirgu Mures,

Romania of 90 consecutive patients undergoing first-time cardiac surgery between January to June 2017. We obtained the Ethical committee approval. All study investigations were conducted in conformity with the declaration of Helsinki standards. Patients' data were included based on the unrestricted access to the patients' medical records, existence of clinical, imagistic data, laboratory results and perioperative ICU data. Exclusion criteria consisted of previous cardiac surgery, chronic kidney disease (CKD), thyroid disorders, history of supraventricular arrhythmia.

For the statistical analysis we used T-test and Fisher's-test (statistical significance $p < 0.05$), using GraphPad Prism 6.0 software, GraphPad Software, Inc, La Jolla, CA 92037 USA.

For the second study we determined circulating levels of several inflammatory markers in 30 consecutive patients undergoing elective isolated on-pump CABG one day prior (D0-1), and 2 (D2) and 5 days post-CABG.

All tests were two-sided and a p-value < 0.05 was considered statistically significant. All data were computed using MedCalc for Windows, version 12.4.3.0 (MedCalc Software, Ostend, Belgium).

As general conclusions we can say that atrial fibrillation is most frequent in the elderly (above 60 years old) with an enlarged atrium. Hypoxia and metabolic acydosis predispose to postoperative atrial fibrillation. The increased number of leucocytes, anemia, and the necessity of positive inotrop and vasoactive drugs are not statistically significant.

Longer duration of extracorporeal circulation (ECC) and aortic clamping caused a larger increase of IL-6 and IL-8 levels post-CABG, but the duration of total CABG surgery had a less significant (for IL-8) or even neglected (for IL-6) effect. IL-8 levels measured at 48 hours after CABG independently predicted postoperative kidney and liver dysfunction, as well as the amount of major post-CABG complications ≥ 2 . Shortening the duration of ECC and aortic clamping, could improve the in-hospital post-CABG outcomes in this population.

Keywords: cardiac surgery, arrhythmias, interleukin