Ischemic modified albumin for detecting perioperative cardiac ischemia

Ameliyat sırası kardiyak iskemi tanısında iskemik modifiye albüminin rolü

Fevzi Toraman,[1] Cem Arıtürk[2]

Departments of [1]Anesthesiology and Reanimation, [2]Cardiovascular Surgery, Medical Faculty of Acıbadem University, İstanbul, Turkey

Dear Editor,

We interestedly read the article of Menteşe et al.[1] entitled "The relationship between ischemia-modified albumin and myocardial infarction in on-pump coronary artery bypass grafting". We suppose that the study, emphasizing the importance of ischemic modified albumin (IMA) in acute myocardial ischemia during coronary artery bypass grafting, has some methodological and statistical mistakes and defects.

As it is underlined in the article; IMA, which reaches the peak value six to 12 hours after the ischemia and returns to its basal values in 24 hours, is an ischemia sensitive biomarker (80%) with low cardiac specificity (50%).[2] The patients in the study were allocated into two groups -patients with and without perioperative myocardial infarction (PMI)- regarding the troponin I (cTnI) levels at the postoperative 48th hour. However, it may be advocated that cTnI elevation at 48th postoperative hour may be due to the hemodynamic instability (hypotension, tachycardia, bradycardia, arrhythmia, low cardiac output) occurred after the 36th postoperative hour rather than perioperative cardiac ischemia. Therefore, allocating the patients into groups regarding the cTnI levels at the postoperative 48th hour may be inaccurate.

To properly compare IMA levels -which are affected not only by cardiac but also other organ ischemia- between two groups, perioperative hemodynamic variables should also be compared.

As IMA is an ischemia marker of all organs, possible ischemic processes of all organs as result of extracorporeal circulation (ECC) may mimic PMI with increased IMA levels. So; low cardiopulmonary bypass flow/low cardiac output, low mean arterial pressure, decreased hemoglobin (<7 g/dL), blood and blood product transfusion, presence of peripheral arterial disease, and diabetes mellitus (DM) may remarkably affect IMA levels.[3] For DM, hemoglobin A1C levels which are independently associated with cTnI levels[3] and which suggest the regulation status of DM (which may affect organ and tissue ischemia) might have been included in the study. Besides eliminating the risk factors of organ and tissue ischemia during ECC, studying IMA levels in the coronary sinus blood may be more specific for cardiac ischemia. Moreover, other systemic perfusion abnormality indicators such as lactate and mixed venous oxygen saturation may be recorded.

Also, defibrillation for ventricular fibrillation after the termination of ECC may cause increased cTnI levels. Therefore, the authors should have studied the defibrillation status of the patients for both groups. Furthermore, acute renal failure, which may also result in increased cTnI levels, may have been evaluated and compared between groups with postoperative urea and creatinine levels.

Besides these methodological problems, statistical power of the study is very low. As we know that PMI rate is 10%;[4] to study the suitability and value of IMA -that has a specificity of 50% for cardiac ischemia[2]- in detecting PMI, power analysis shows that at least 138 patients should have been analyzed.

The value of IMA in early detection of PMI may be demonstrated with a study correcting these methodological and statistical errors.

REFERENCES

1. Menteşe Ü, Doğan OV, Doğan S, Turan İ, Usta U, Demirbaş M, et al. The relationship between ischemia-modified albumin and myocardial infarction in on-pump coronary artery bypass grafting. Turk Gogus Kalp Dama 2015;23:245-50.

2. Pantazopoulos I, Papadimitriou L, Dontas I, Demestiha T, Iakovidou N, Xanthos T. Ischaemia modified albumin in the diagnosis of acute coronary syndromes. Resuscitation 2009;80:306-10.

3. Krintus M, Kozinski M, Boudry P, Lackner K, Lefèvre G, Lennartz L, et al. Defining normality in a European multinational cohort: Critical factors influencing the 99th percentile upper reference limit for high sensitivity cardiac troponin I. Int J Cardiol 2015;187:256-63.

4. Yau JM, Alexander JH, Hafley G, Mahaffey KW, Mack MJ, Kouchoukos N, et al. Impact of perioperative myocardial infarction on angiographic and clinical outcomes following coronary artery bypass grafting (from PRoject of Ex-vivo Vein graft ENgineering via Transfection [PREVENT] IV). Am J Cardiol 2008;102:546-51.

Author's Reply

Dear Editor,

Thanks for the interest shown to our research article entitled "The relationship between ischemia-modified albumin and myocardial infarction in on-pump coronary artery bypass grafting".[1] We suggest the authors to carefully read the guidelines and definition of myocardial infarction. We define perioperative myocardial infarction (PMI) according to current guidelines and universal definition of myocardial infarction; PMI was defined as a troponin I value of more than 10 times the 99th percentile of the upper reference limit during the first 48 hours following coronary artery bypass grafting based on a normal baseline troponin I value of less than or equal to 99th percentile of the upper reference limit. In addition, either new pathological Q waves or a new left bundle branch block must also be present to have PMI.[2] Therefore, whatever the reason, the consequence is PMI.

We included patients with stable coronary artery disease in this study. Overall two patients in the PMI group and 13 patients in the non-PMI group had diabetes and it was none significant. According to current guidelines, elective surgery should be performed after regulation of diabetes. We performed all procedures as directed by guidelines. Additionally, none of the patients in the PMI group had peripheral artery disease, so such an influence could not be observed in this study. Perioperative myocardial infarction is an important reason for perioperative low output state.

As limitations, we stated the small scale of the study and requirement of additional studies.

REFERENCES

1. Menteşe Ü, Doğan OV, Doğan S, Turan İ, Usta U, Demirbaş M, et al. The relationship between ischemia-modified albumin and myocardial infarction in on-pump coronary artery bypass grafting. Turk Gogus Kalp Dama 2015;23:245-50.

2. Thygesen K, Alpert JS, Jaffe AS, Simoons ML, Chaitman BR, White HD. Third universal definition of myocardial infarction. Circulation 2012;126:2020-35.

Correspondence: Ümit Menteşe, M.D. Ahi Evren Göğüs Kalp ve Damar Cerrahisi Eğitim ve Araştırma Hastanesi, Kalp ve Damar Cerrahisi Kliniği, 61000 Trabzon, Turkey.

Tel: +90 462 - 231 19 07   e-mail: drumentese@gmail.com