EDITORIAL OPEN ACCESS

Mean platelet volume predicts development of postoperative atrial fibrillation following coronary bypass surgery

Askin Ender Topal

Postoperative atrial fibrillation (AF) following coronary bypass surgery is an undesirable complication which causes higher mortality and morbidity rates leading to longer hospital stay and increased cost. If patients, who will experience AF after coronary artery bypass grafting, can be guessed somehow; prophylactic treatment may be initiated preoperatively to prevent AF genesis. So, detection of population who are susceptible to atrial fibrillation is essential.

Many risk factors for atrial fibrillation genesis were assigned such as age, obesity, male gender, hypertension, prior AF, myocadial systolic dysfunction, chronic obstructive pulmonary disease, chronic renal insufficiency and on-pump surgery [1–4]. Especially, advanced age disturbs atrial physiology. Progression of atrial fibrosis and accumulation of amyloid with advanced age causes stiffness leading to intraatrial re-entry, then to development of AF [5]. However no one of these, including advanced age, has not been shown as a constant independent risk factor with a cut-off value above which AF will develop most likely, representing high sensitivity and specificity. So these factors are not relevant for our purpose exactly. At this point, a need for another risk factor emerges. I think it may be mean platelet volume (MPV).

Mean platelet volume reflects platelet function, as larger platelets are hemostatically more reactive increasing the tendency of inflammation, thrombosis and atherosclerosis. For a long-time, MPV has been known to be in close relationship with cardiovascular diseases and also cardiovascular risk factors listed above [4, 6]. Additionally, MPV has been identified as an indicator of prognosis in case of cardiovascular diseases with coexisting AF [7, 8]. In a previous study, MPV was declared to predict stroke [9]. In another study, higher MPV represented worse coronary blood flow in despite of lack of obstruction in coronary arteries [10]. Han et al. [11] determined a cut-off level of MPV as 7.95 fl regarding to genesis of stroke and coronary artery disease. Xu et al. stated MPV as a predictive factor for thromboembolic events in the presence of AF [12]. Also, Choudhury et al. found MPV levels higher in patients with permanent atrial fibrillation compared to patients with paroxysmal atrial fibrillation [7]. Nevertheless, MPV effect on AF genesis has not been investigated thoroughly. The relationship between MPV and AF genesis was concluded significantly with odds ratio 2.564, 95% confidence interval 1.326–4.958, p = 0.005 in a recent study; interestingly many risk factors listed above were not found to predict development of AF [13].

Data of patients who underwent coronary bypass surgery in my clinic were screened retrospectively, all risk factors listed above were collected and many other parameters regarding to demography, echocardiograhy, coronary angiography, biochemical analysis and hematological analysis were added additionally. As a result, MPV was found to be the only independent risk factor for AF genesis with a cut-off value of 7.59 fl with 95% sensitivity and 64% specificity. Interestingly, no other risk factor could not be associated with postoperative AF; even advanced age, complexity of coronary arterial lesion, diameter of left atrium or comorbid diseases. So I suggest the preoperative measurement of MPV which is a cost-effective, simple and readily available tool to predict the postoperative AF.

This finding contributes two advantages in terms of the approach to the treatment of patients with coronary artery disease. First is the chance for prophylactic treatment against AF before surgery such as β-blockers, amiodarone and also angiotensin-converting enzyme inhibitors. Beta blockers decrease sympathetic tonus which predisposes patients to AF genesis. Angiotensin-converting enzyme inhibitors prevent development of AF

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via the mechanisms of reducing atrial stretch, impeding of atrial fibrosis and blocking of electrical remodeling [14].

Previous sudies were conducted only on the association between AF and MPV. However, my clinical series consisted of non-AF patients and it showed that patients with higher MPV was under higher risk for AF genesis. In another words, rising of MPV was before the development of AF, then higher MPV was not a result, it was a cause for AF. There are many studies to answer the question 'how can MPV be decreased?'. Sivri et al. [15] reported that statin treatment decrease MPV significantly in one month via lipid-independent effects regardless of its cholesterol lowering effect. Clopidogrel was recommended to decrease platelet size whereas aspirin was accused to have no effect [16]. Yazici et al. [17] showed the beneficial effects of lifestyle modifications such as weight loss, reduced sodium intake, increased physical activity, limited alcohol consumption on reduction of MPV.

Second advantage is probability of decreasing MPV before surgery with the aid of statins, clopidogrel and lifestyle modification. But as far as I know there is not any study on whether decreased MPV decreases postoperative AF rates which is still a paucity. This subject needs to be studied by many clinical series with wide study groups. But, at least for the present, it is theoretically probable. If further prospective large clinical series prove the beneficial effects of decreasing MPV on postoperative AF genesis, preoperative usage of statins or clopidogrel or any other medication will be standard approach and in this way postoperative undesirable events due to AF will be prevented.

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Keywords: Atrial fibrillation, Coronary artery bypass grafting, Mean platelet volume

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Askin Ender Topal – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

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The corresponding author is the guarantor of submission.

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Conflict of Interest

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