



# Troponin in non-cardiac department—finding a stray piece of puzzle?

Tomasz Urbanowicz

Poznan University of Medical Sciences, Poznan, Poland

Correspondence to: Tomasz Urbanowicz. Poznan University of Medical Sciences, Poznan, Poland. Email: tomasz.urbanowicz@skpp.edu.pl.

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The results of the Oh *et al.* analysis (1) “*Association between cardiac troponin testing at scheduled admission and mortality in patients with comorbidities*” presents the utility of troponin I screening test basing on the analysis performed on 289,764 consecutive asymptomatic patients who were admitted from the outpatient clinic to non-cardiological/non-cardiac surgery departments.

Although the elevation of myocardial marker was found in only 8% of screened patients, the superior clinical course within 1 year was achieved by cardiologists’ consultation and additional examinations, followed by further management and therapy changes. Two important findings of the study are related to increased clinical vigilance with troponin use. First, the survival rate was higher in the subgroup who underwent more meticulous diagnostics followed by implementation of targeted therapy. Troponin measurement is currently routinely used in acute coronary syndromes diagnostics. However, its significance is still high in the management of patients in whom myocardial infarction was ruled out. The most important value is further introduction or intensification of pharmacological or interventional therapy. Second, the mortality was higher in patients with troponin I elevation despite more accurate management. This observation is reasonable and results from well-known worse prognosis in patients burdened with cardiovascular morbidity characterized with troponin rise. This phenomenon refers to chronic heart failure, acute myocarditis, uncontrolled arterial hypertension, thromboembolic disease, pulmonary hypertension, renal

failure, pneumonia. The troponin rise characterizes patients at more advanced stages of disease and at higher mortality risk.

The study underlines an importance of troponin measurement and evaluation, particularly in patients with several co-morbidities and in presence of mild or even no cardiovascular symptoms. It’s worth to underline that routine tests should be reasonably interpreted, as sport-active population may be characterized with troponin I elevation secondary to extensive physical activity (2,3). Strenuous exertion, such as marathon running, is associated with significant but transient increase in plasma troponin and inflammatory biomarkers, however it does not translate to irreversible cardiac dysfunction (4).

Troponins are well-established biomarkers of acute myocardial infarction. However, several issues should be pointed out in accurate assessment of the usefulness of cardiac troponins in clinical practice. Despite high sensitivity troponins are not the ideal markers for the diagnosis of myocardial infarction, as the elevation may also occur in numerous other pathologies and circumstances related to damage of myocardial cells. The Wereski *et al.* (5) analysis revealed insufficient predictability of lone marker measurements in symptomatic patients for differentiation of myocardial infarction type 1 from other causes of myocardial injury. Neumann *et al.* (6) basing on their multicenter study results suggested that dynamic change in concentration is of outmost importance for infarction diagnosis, still focusing on acute coronary syndromes. In

turn, Roos *et al.* (7) showed that in stable patients with chest pain and stable troponin levels, any detectable level of high sensitivity troponin predicts an increased risk of death and should merit careful evaluation.

Obviously, atherosclerotic disease is not limited to coronary arteries. Since atherosclerotic plaques are present in the whole vascular bed, cardiovascular disorders of different body areas influence the overall outcome. Mouselimis *et al.* (8) collected troponin measurements in patients with claudication and without cardiac symptoms. They concluded that this group is burdened with high cardiovascular risk, since 4% of patients exhibited an elevated troponin, including 2% with myocardial infarction. Specifically, those with history of coronary artery disease presented troponin elevation although being asymptomatic. The study points out that clinical vigilance is required in patients with diffuse atherosclerotic disease with need for potential qualification to cardiac revascularization prior to peripheral artery disease treatment.

Importantly, the high sensitivity of current troponin measurement methods leads to revealment of even slight troponin rise without cardiac cells necrosis. Therefore, with high sensitivity, the specificity of troponin measurements decreases. High troponin concentration within the normal range was associated with increased cardiovascular risk in the general population, independently from conventional risk factors (9). In such circumstances the diagnostics with the use of troponin may be challenging, however, it may lead to more meticulous clinical investigation followed by improved outcomes and survival. Elevated or at upper normal range levels of troponin may be present in several acute or chronic diseases and associated with worse prognosis (10). Therefore, early changes in pharmacotherapy may influence the long-term outcomes which was underlined in the study by Oh *et al.* (1). Troponin elevation was presented in acute decompensation and liver failure with increased mortality (11). Nasr *et al.* (12) showed positive role of troponin assessment for early screening of the primary stages of heart disease in patients with chronic kidney disease. Detectable cardiac troponins and N-terminal brain natriuretic peptide are associated with higher left ventricular mass index, cardiovascular events, and death (13).

The significance of perioperative troponin surveillance was also proven in several studies concerning non-cardiac surgery. Pre, peri and post-operatively increased troponin are generally named “myocardial injury” and may reflect different pathophysiological mechanisms. The marker increase is associated with cardiovascular and non-

cardiovascular complications, worse short-term and long-term cardiovascular outcomes, and increased mortality (14). The risk of mortality is greatest among those with perioperative troponin elevation, with greater increases indicating higher risk (15,16).

As mentioned before, the sole troponin use is challenging for proper diagnostics of cardiovascular disorders. Therefore, several studies aimed to evaluate the diagnostic accuracy of other markers combined with troponin (17). Except from commonly used, highly specific markers, currently the indexes from whole blood count analysis raise attention for cardiovascular diseases diagnosis and outcomes prediction (18,19). I believe that currently, considering prolonged life span and age-related increase in co-morbidities, the routine screening test should be more comprehensive and focused on long-term survival improvement.

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