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Editorial

Subclinical and Tiny Myocardial Injury within Upper Reference Limit of Cardiac Troponin Should Not Be Ignored after Noncardiac Surgery

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▸ See the article "Mildly Elevated Cardiac Troponin below the 99th-Percentile Upper Reference Limit after Noncardiac Surgery" in volume 50 on page 925.

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Annually, more than 200 million patients undergo noncardiac surgery worldwide, and approximately 100 million patients over the age of 45 years are at risk for myocardial infarction (MI) and injury.[1] Among them, 1.1 million (1.1%) patients have perioperative MI with ischemic symptoms, whereas 2.2 million (2.2%) patients have asymptomatic MI and 4.6 million (4.6%) have myocardial injury.[1-3] The 30-day mortality of these 3 groups is 9.7%, 12.5%, and 7.8%, respectively; that is, over 750,000 deaths within 30 days of noncardiac surgery, annually.[1-3] Accordingly, rapid and reliable diagnosis of perioperative myocardial injury is an important step in improving the prognosis of this underappreciated perioperative complication.

In general, myocardial injury after noncardiac surgery (MINS) is identified as a myocardial injury due to ischemia (i.e. supply-demand mismatch or thrombus) that occurs during or within 30 days following surgery, with a strong association to mortality.[2] The diagnosis of MINS is made based on the high sensitivity cardiac troponin (cTn) assay.[4] An elevated cTn value of above the 99th percentile upper reference limit (URL: cTn T <14 ng/L, cTn I <40 ng/L) is defined as myocardial injury and that of below the 99th percentile URL is generally regarded as normal, and thus, is payed less attention.[4]

However, even a mild elevation of cTn below its URL has been shown to be significantly associated with increased mortality after noncardiac surgery. In a large prospective cohort study, the Vascular Events in Noncardiac Surgery Patients Cohort Evaluation (VISION) study, the peak postoperative high sensitivity cTn T levels of 5 to less than 14 ng/L was shown to be associated with an increased risk of 30-day mortality (adjusted hazard ratio [HR], 3.73; 95% confidence interval [CI], 1.58–8.82).[5] In a study by Park et al., a mildly elevated cTn I levels of 6 to less than 40 ng/L after noncardiac surgery was shown to be significantly associated with increased 30-day mortality (HR, 4.30; 95% CI, 2.23–8.29) as compared with the lowest limit of detection (cTn I <6 ng/L).[6] These results suggest that subclinical and tiny MINS affect the clinical outcomes of patients.

Although many studies have demonstrated the prognostic relevance of perioperative MI and MINS that do not adhere to the conventional definition of MI, the management of MINS is still not well-established. Indeed, recent data showed that mortality in patients with MINS that do

not fulfill any other criteria (ischemic symptoms, new electrocardiography changes, or imaging evidence of loss of viable myocardium) required for spontaneous acute MI is comparable to those patients who fulfill other criteria.[7] Furthermore, as for the treatment of MINS, there is currently no consensus on which therapy would be most effective in improving the prognosis. Based on previous data, low dose aspirin, statin, and beta blocker could be considered; and according to the most recently published MANAGE Trial, dabigatran 110 mg twice daily may reduce the risk of major vascular complication, a composite of vascular mortality and non-fatal myocardial infarction, non-haemorrhagic stroke, peripheral arterial thrombosis, amputation, and symptomatic venous thromboembolism in patients with MINS.[8][9]

Previous studies have focused mostly on MINS as defined by a cTn T level of above the 99th percentile URL; however, Park et al.[6] demonstrated that even MINS as defined by a mild elevation of cTn I level of below the 99th percentile URL was associated with 30-day mortality after noncardiac surgery. Furthermore, all of the previous studies on postoperative elevation used cTn T, instead of cTn I used in the study of Park et al.[6] The findings put forth by Park et al.[6] provides new insights with respect to the postoperative management of patients with subclinical and tiny MINS. A future prospective study with a larger population is warranted to validate the strategy and management of subclinical and tiny MINS.

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