Editorial

In this edition of the journal, Drs Kisten and Biccard have published an interesting article evaluating the incidence and in-hospital mortality among patients suffering a perioperative myocardial infarction (PMI) and myocardial injury after noncardiac surgery (MINS) in a retrospective cohort of 140 vascular surgery patients admitted to an intensive care unit (ICU) after surgery.[1] The authors defined PMI based on the Third Universal Definition of Myocardial Infarction[2] and used a Siemens troponin I threshold of ≥ 600 ng/L and MINS based on a troponin I of 41 to 599 ng/L that was adjudicated as resulting from an ischaemic aetiology. PMI occurred in 34 patients (24.3%) and MINS in 35 patients (25.0%). The incidence of in-hospital mortality among patients who did not suffer PMI or MINS, had MINS, and had PMI was 18.3%, 20.0%, and 58.8% respectively. A multivariable model that included PMI, MINS, and postoperative brain natriuretic peptide demonstrated that only PMI was associated with in-hospital mortality (odds ratio, 4.3; 95% confidence interval [CI], 1.4–12.9).[1]

This study provides important information highlighting the impact of PMI in South African vascular surgery patients admitted directly to an ICU. Before dismissing MINS that did not fulfill the diagnostic criteria for PMI, several points are worth considering.

The VISION study was a large, international, prospective cohort that included a representative sample of patients ≥ 45 years of age who underwent in-patient noncardiac surgery.[3] In contrast to the findings in the current study, in analyses of 15 065 patients, the VISION Study demonstrated that a MINS event that did not fulfill the Universal Definition of MI was independently associated with 30-day mortality (adjusted hazard ratio [HR], 3.3; 95% CI, 2.3–4.8).[4] Moreover, these VISION analyses included patients from South Africa, and the frailty model suggested the results were consistent across study centres.

A substudy focused on the 502 vascular surgery VISION patients demonstrated a 30-day mortality rate of 12.5% (95% CI, 7.3–20.6%) and 1.5% (95% CI, 0.7–3.2%) in patients who suffered and did not suffer MINS, respectively.[5] MINS was independently associated with mortality (adjusted odds ratio [OR], 9.5; 95% CI, 3.5–26.0). The 30-day mortality was similar in MINS patients who did (15.0%; 95% CI, 7.1–29.1) and did not (12.2%; 95% CI, 5.3–25.5, p=0.76) fulfill the Universal Definition of Myocardial Infarction, and the proportion of vascular surgery patients who suffered MINS without overt evidence of myocardial ischemia was 74.1% (95% CI, 63.6–82.4).

In the current study,[1] the authors used a troponin I assay for which MINS thresholds have not been established. Recently, 5th generation high-sensitivity troponin T (hsTnT) thresholds independently associated with 30-day mortality were identified through iterative cox proportional hazards models from 21 842 patients in the VISION Study.[6] Based on these analyses, VISION investigators defined MINS as an hsTnT ≥ 20 ng/L and < 65 ng/L with a change of ≥ 5 ng/L or hsTnT ≥ 65 ng/L within 30-days after surgery that was adjudicated as resulting from an ischemic etiology. The thresholds determined by these analyses are higher than the 99th percentile of URL for the hsTnT assay (14 ng/L). This publication highlights the importance of determining the threshold for each troponin assay in the perioperative setting because the 99th percentile threshold proposed by the Third definition of MI may not apply in the perioperative setting. It is possible that the Siemens TnI thresholds, used by the authors of the current study to define MINS, were suboptimal.

The VISION investigators have also shown that the higher the troponin threshold the stronger the association to death.[6] It is therefore possible in the current study of 140 patients that the authors simply did not have enough power to establish the association between their MINS diagnostic criteria and in-hospital mortality.

Although at present there are no published randomized controlled trials informing treatment effects of interventions in patients suffering MINS, perioperative observational studies suggest that secondary prevention cardiovascular treatments appear to have benefit. One French study showed that MINS patients who received cardiovascular treatment optimization based on aspirin, statin, angiotensin-converting enzyme inhibitor and beta-blocker had similar outcomes to perioperative patients who did not suffer MINS (HR, 0.6; 95% CI, 0.1–1.2; p=0.45); however, patients who suffered MINS who did not receive or have intensified one or more of these cardiovascular medications had a worse 1 year major cardiovascular outcome than patients who did not suffer MINS (2.8; 95% CI, 1.1–24.2; p= 0.04).[7] Similarly in the POISE Trial, multivariable regression analysis suggested that among patients who had a perioperative myocardial infarction acetylsalicylic acid and statin use were associated with a reduction in the risk for 30-day mortality (adjusted ORs, 0.54; 95% CI, 0.29–0.99 and 0.26; 95% CI, 0.13–0.54 respectively).[8] Based on these findings the recently published Canadian Perioperative Guidelines strongly recommends the initiation of long-term aspirin and statin for patients who suffer MINS.[9]

Considering the totality of data, MINS events that do not fulfill the Universal Definition of Myocardial Infarction appear to have important prognostic implications for patients. The VISION vascular surgery substudy suggests these results also apply to vascular surgery patients.[5] Further studies like the one by Drs Kisten and Biccard[1] are needed to better understand MINS in South Africa and the African continent.

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