e-Cardiology / Digital Health, Public Health, Health Economics, Research Methodology -- Research Methodology -- Cardiovascular Epidemiology

Thromboembolic complication among COVID-19 patients in the intensive care unit (ICU): a single-centre study from a Malaysian perspective

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Introduction: The emerging complications of thromboembolism (TE) in COVID-19 patients have led to severe consequence such as death. Nonetheless, the prevalence of TE complications among COVID-19 patients in the Intensive Care Unit (ICU) in Malaysia is unknown.

Objective: To investigate the prevalence of thromboembolic (TE) complications including venous [deep vein thrombosis (DVT), pulmonary embolism (PE), and line related thrombosis] and arterial [stroke, peripheral arterial disease and myocardial infarction (MI)] thrombosis and mortality among COVID-19 patients admitted to an ICU at a single centre hospital. The proportions of patients with TE complication who died, and factors associated with the occurrence of thrombotic complications were explored.

Methods: In this retrospective Malaysian cohort study, patients admitted to a single centre ICU with PCR confirmed of SARS-CoV-2 virus and received adequate thromboprophylaxis within February 2020-2021 were included. Thromboembolic (TE) event is a combination of venous and arterial thrombosis.

Results: Mean (SD) age 56.6 (13.7), 63.5% were male, 61.6% Malays, median (IQR) 7 (3-14) days of ICU admission, 64.2%, 53.2% and 20.9% had underlying hypertension, diabetes and obesity respectively. Of 534 patients, 4 (0.7%) developed DVT, 198 (37.1%) PE and 2 (0.4%) line related thrombosis. Meanwhile, 21 (3.9%) developed stroke, 39 (7.3%) MI, 1(0.2%) PAD and 22.8% died despite adequate thromboprophylaxis. In total, 240 (44.9%) developed TE event during their ICU admission. Significantly higher proportions of COVID-19 patients who developed complications of DVT (2.5% vs. 0.2%; $p = 0.013$), PE (47.5% vs 34.0%; $p = 0.006$), stroke (12.3% vs. 1.5; $p < 0.001$) and MI (16.4% vs. 4.6%; $p < 0.001$) died. Age, duration of ICU admission, obesity, white cell count (WCC), troponin, D-Dimer and corticosteroid use were significantly greater among those with TE events. Demographics, co-morbidities, other laboratory parameters and inflammatory markers were similar in COVID-19 patients with and without TE events. Predictors of TE events on multivariate logistic regression analysis were age [OR 1.02 (95% CI 1.00-1.03)], obesity [OR 2.84 (95% CI 1.93-4.18)], WCC [OR 1.04 (95% CI 1.00-1.07)], and duration of ICU admission [OR 1.04 (95% CI 1.02-1.06)].

Conclusion: In this cohort of severely ill COVID-19 patients, the overall prevalence of TE complication was high (44.9%) with the overall mortality of 22.8% despite adequate thromboprophylaxis. Key predictors of TE events included age, obesity, white cell count, and duration of ICU admission. Perhaps a more aggressive treatment (combination of thromboprophylaxis and enhanced anti-inflammatory treatment) may be needed among COVID-19 patients admitted to ICU with high risk factors to prevent further increase in the incidence of thromboembolism and death.