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Derivation and validation of a pretest probability score for deep vein thrombosis before surgery

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Background: Venous thromboembolism represents a crucial perioperative complication and causes morbidity and mortality. It is important to predict deep vein thrombosis (DVT) before surgery under general anesthesia.

Purpose: We developed a pretest probability score for predicting DVT with perioperative clinical and laboratory variables.

Methods: Total 7435 patients were planed surgery under general anesthesia between 2017 and 2018. 1313 patients were performed whole leg ultrasonography suspected DVT using cutoff point of D-dimer $\geq 1\mu g/ml$. We excluded age <18 years, ongoing anticoagulant therapy, other thrombosis, protein C deficiency, disseminated intravascular coagulation, central venous catheter, pregnancy and aneurysm. We enrolled 971 patients, we divided into the derivation cohort or the validation cohort. The association of DVT with multiple variables was characterized in a derivation cohort of 651 patients. The score validated in an independent cohort of 322 patients from the same study. We also performed a validation of this model in an independent cohort of patients derived from the same observational study.

Results: We found 6 clinical and 1 laboratory parameters that predicted DVT in patients before surgery. The prediction rule for DVT assigned 2 points for D-dimer more than 1.44 µg/ml and 1 point for age ≥ 60 years, female, ongoing steroid, active cancer with high risk of DVT, prolong immobility and antipsychotic drug. In derivation and validation cohorts, area under the curve was 0.73 and 0.70, respectively. New preoperative risk model with these parameters stratified patients into 3 individual categories corresponding to the risk of DVT. Rates of DVT in the derivation and validation cohorts, respectively, were 6% and 7% in low-risk (score 0–2), 22% and 21% in intermediate-risk (score 3–4), and 49% and 47% in high-risk (score ≥ 5) category. Rates of fresh DVT were 1% and 3% in low-risk, 10% and 9% in intermediate-risk, and 33% and 19% in high-risk category.

Conclusion: This score stratifies perioperative DVT risk and may detect effectively DVT. The findings should be considered with the further prospective research.

Rate of DVT