Validated Risk Stratification System for Pulmonary Embolism Following Primary Total Joint Arthroplasty

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Introduction: Stratification of patients into different risk categories for pulmonary embolism (PE) following total joint arthroplasty (TJA) may allow clinicians to individualize PE prophylaxis based on an appropriate risk-benefit scale. The purpose of this study was to categorize patients into different risk categories for PE following TJA.

Methods: Patients undergoing primary total hip or knee arthroplasty (THA or TKA) as part of the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) were identified. Independent risk factors for PE within 30 days of surgery were identified. A point-scoring system to estimate the relative risk for PE was developed. To validate the system, the system was tested on patients undergoing TJA at a single institution, all of whom received warfarin prophylaxis.

Results: Using the ACS-NSQIP database, 118,473 patients undergoing TJA were identified. The incidence of PE within 30 days of the index arthroplasty was 0.50%. The risk factors associated with PE were: age$\geq$70, female gender, higher body mass index (BMI; 25-30kg/m2 and $\geq$30kg/m2), and TKA (vs. THA); anemia was protective. Based on the nomogram analysis, the point scores derived for each of these factors were as follows: anemia -2; female +1; BMI 25-30kg/m2 +2; BMI $\geq$30kg/m2 +3; age$\geq$70 years +3; TKA +5. The point scoring system was then applied to 19,053 patients from a single institution. Single-institution patients categorized as low risk using the point scoring system had a 0.39% risk for PE (95% CI=0.26-0.52%); medium risk, 1.42% (95% CI=1.11-1.72%); and high risk, 2.51% (95% CI=2.03-3.00%).

Conclusion: Using the ACS-NSQIP database, a point scoring system for the risk of PE following TJA was developed. This point scoring system was validated on patients from a single institution, all of whom received warfarin prophylaxis. This scoring system may facilitate risk stratification and optimize selection of chemical prophylaxis.