New Risk Assessment Tool For Venous Thromboembolism in Plastic Surgery Patients: Analysis of National Surgical Quality Improvement Program Dataset

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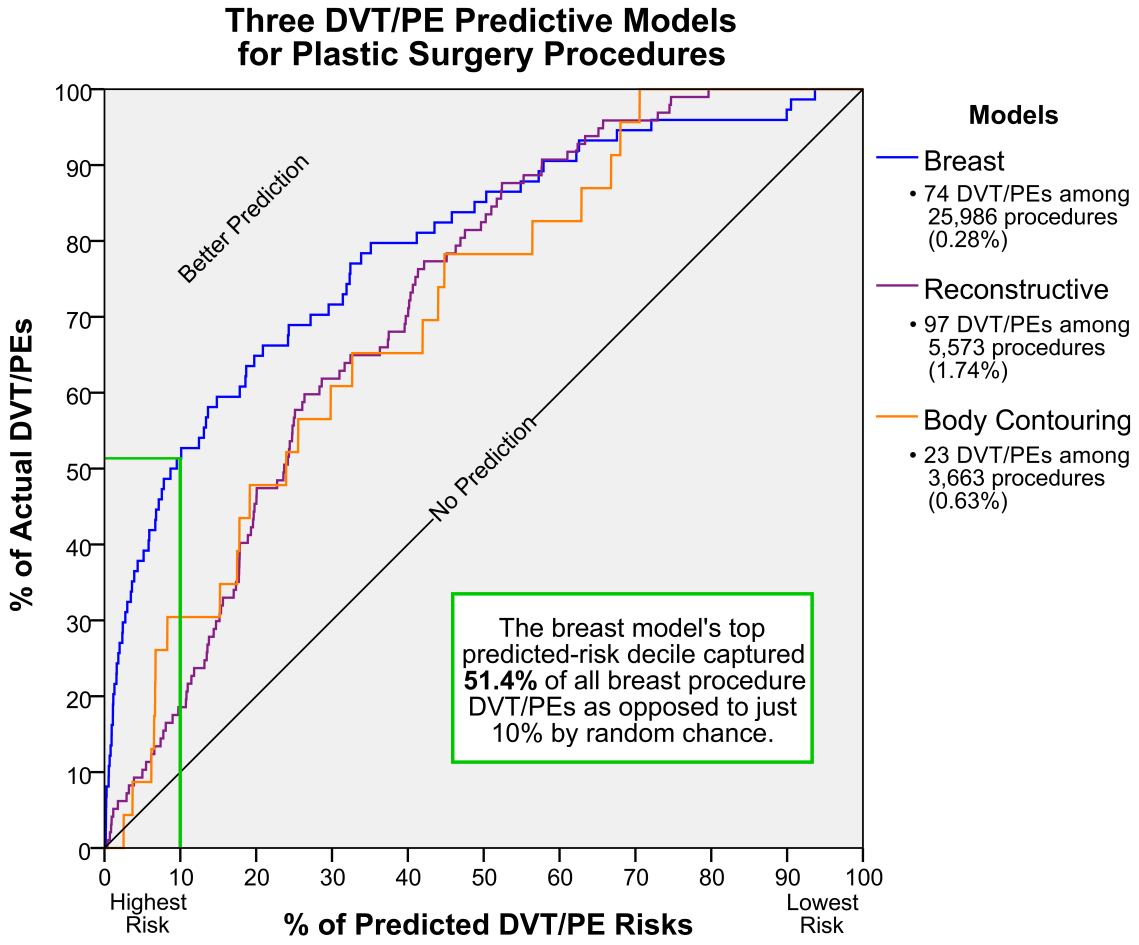
Purpose:
Deep vein thrombosis and pulmonary embolism, the common clinical manifestations of venous thromboembolism (VTE), are among the most common preventable complications in patients undergoing plastic surgery procedures. Because VTE prophylaxis often remains suboptimal despite long-standing evidence-based recommendations, it would be useful to identify high-risk patients ahead of time to deliver targeted prophylaxis. Using the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database, we created several risk assessment models, which can reliably identify patients with high risk of VTE events.

Methods:
A retrospective analysis was conducted on commonly performed plastic surgery procedures identified by 55 CPT codes, from the 2006-2012 NSQIP participant use data file. The cohort was classified into three groups: breast, reconstructive and body contouring procedures. The most significant risk factors associated with postoperative VTE were determined and a multiple logistic regression model was fit for each group.

Results:
Results: 35,521 patients who underwent plastic surgery procedures were included in the analysis. Rate of VTE event in the entire group was 0.55% (195 cases). The highest incidence of VTE was observed in general reconstructive procedures group (1.7%) and the lowest incidence was found among the breast procedures (0.29%). After analyzing 136 variables included in NSQIP database we identified only four, which were strongly associated with VTE events. The main predictors of thromboembolic events in these groups were: age of the patient, body mass index, operation time and history of sepsis during same admission (*p value < 0.05*). 57.8% of VTEs occurred post-discharge, and of those, 41.4% occurred within one week. Using NSQIP derived data, we created statistical models that can serve as a reliable and clinically applicable tool for identification of high-risk plastic surgery patients, who might require extended VTE prophylaxis after hospitalization (Figure 1).

Conclusions:
Multiple strategies and national initiatives have been developed to improve rates of VTE prophylaxis during hospitalization; however, according to our data significant portion of VTE events occurs after the discharge. We identified strongly associated VTE risk predictors for plastic surgery patient population. The models, which were created, can serve as a valuable tool to guide DVT prophylaxis in patients undergoing breast, body contouring and reconstructive procedures. It can also be used to identify the patients who will benefit from extended-duration VTE prophylaxis after hospital discharge.


Three DVT/PE Predictive Models
for Plastic Surgery Procedures
% of Actual DVT/PEs
% of Predicted DVT/PE Risks
Highest Risk
Lowest Risk
Better Prediction
No Prediction
The breast model's top predicted-risk decile captured 51.4% of all breast procedure DVT/PEs as opposed to just 10% by random chance.
Models
Breast
• 74 DVT/PEs among 25,986 procedures (0.28%)
Reconstructive
• 97 DVT/PEs among 5,573 procedures (1.74%)
Body Contouring
• 23 DVT/PEs among 3,663 procedures (0.63%)