

Introduction

Venous thromboembolism (VTE) comprises deep vein thrombosis (DVT) and pulmonary embolism (PE). Neurosurgery patients are at increased risk for VTE, especially those undergoing operations of prolonged duration or that have underlying limb paresis/plegia. Because of the risk for catastrophic hemorrhage in neurosurgical cohorts, postoperative chemoprophylaxis is not routine and often left to the discretion of the treating neurosurgeon. Here we sought to identify VTE risk factors in patients undergoing non-emergent craniotomy in order to determine those at highest risk in the postoperative period.

Methods

We employed the 2010-2014 cohorts of the Nationwide Readmission Database. Readmission for venous thromboembolism was identified by using the corresponding ICD-9CM diagnosis codes. Various patient and hospital-related factors were explored for their association with readmission for VTE in multivariate analysis.

Results

Among 89,450 craniotomies, there was a 1.69% (1513) incidence of VTE within 30 days. The corresponding incidence of DVT and PE were 1.19% and 0.93%, respectively. The median time to 30-day readmission was 13 days. Patients who underwent craniotomy for benign and malignant tumors had increased risk of VTE compared to cerebrovascular operations (OR 2.01-2.43, p <0.0001). Patients with chronic steroid use were also at increased risk for VTE (OR 1.41, p = 0.03). Patients of advanced age (75 years and older) had increased likelihood of VTE (OR 1.69, p < 0.0001) compared to younger cohorts (18-44 years). And finally, patients with non-routine hospital discharge (e.g. short-term hospital, SNF) had higher odds of VTE (OR 1.3-2.6, p < 0.0001).

Table 1. Predictors of 30-day readmissions for VTE by multivariate analysis using survey-adjusted logistic regression					
	Variables	Odds Ratio	95% CI		p-value
Craniotomy cohort	Malignant Tumor	2.431	2.021	2.923	<.0001
	Benign Tumor	2.015	1.654	2.454	<.0001
	Vascular	Ref			
	Epilepsy	0.863	0.352	2.117	0.7468
Age	18-44	Ref			
	45-59	1.364	1.146	1.622	0.0005
	60-74	1.613	1.36	1.913	<.0001
	>=75	1.69	1.375	2.077	<.0001
Gender	Male	1.15	1.037	1.276	0.0082
	Female	Ref			
Disposition	Routine	Ref			
	Short-term Hospital	2.623	1.939	3.549	<.0001
	Transfer Other	1.736	1.506	2	<.0001
	Home Health Care	1.327	1.155	1.524	<.0001
Index Length of stay	Against Medical Advice	*			
	0-3 days	Ref			
	4-5 days	1.232	1.037	1.465	0.0178
	6-11 days	1.526	1.305	1.784	<.0001
	>=12 days	1.959	1.674	2.291	<.0001
Steroid use	Yes	1.408	1.034	1.917	0.03
	No	Ref			

Conclusions

Patients who underwent craniotomy for tumor, those of advanced age, those who use steroids or were discharged to institutional care have increased risk of VTE. Increased vigilance should therefore be maintained in these groups by administering timely chemoprophylaxis in the postoperative period. Discontinuation of steroids or use of a lower dose whenever feasible is also warranted given the potential for harm from thromboembolic phenomena.

Learning Objectives

- 1.Understand that patients who undergo craniotomy for tumor have higher risk of readmission with VTE compared to craniotomy for cerebrovascular conditions or epilepsy.
- 2.Understand that steroids increase the risk of VTE and represent a highly modifiable risk factor given its ubiquity within neurosurgery
- 3.Understand that other non-modifiable risk factors increase the risk of VTE including advanced age and discharge to institutional care (e.g. skilled nursing facility).