Corticosteroid Use is Associated with Venous Thromboembolism in Neurosurgery: A Nationwide Analysis

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Introduction

Venous thromboembolism (VTE) is a major preventable cause of morbidity and mortality in hospitalized patients, and is a widely accepted indicator of quality of care. Patients undergoing neurosurgery are at high risk of VTE due to prolonged bed rest and frequent contraindications to VTE prophylaxis with anticoagulants. Recently, prolonged corticosteroid therapy—common in this population—has been associated with VTE. Using a national database, we sought to determine whether corticosteroid use >10 days is an independent risk factor for VTE.

Methods

The well-validated American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database was queried to evaluate the rates of VTE between 2006 and 2013 in patients undergoing neurosurgical procedures. After a univariate analysis, a multivariate regression model was constructed to assess the effect of prolonged corticosteroid use on the occurrence of pulmonary embolism (PE) and deep vein thrombosis (DVT) by postoperative day 30 (see table).

Results

Of 94,620 patients identified, 565 (0.60%) developed PE and 1,057 (1.12%) developed DVT within 30 days after surgery. In the multivariate models (see table), patients on corticosteroids were significantly more likely to have PE [OR: 1.47 (95% CI 1.13-1.90); p=0.004) and DVT [OR: 1.55 (1.28-1.87); p<0.001]. Other factors independently associated with development of PE and DVT included presence of malignancy, longer hospitalization, certain infections (including pneumonia and urinary tract infections), and stroke with a neurological deficit.

Conclusions

Among the neurosurgical populations, prolonged courses of corticosteroids are associated with an increased risk of developing postoperative DVT and PE, even when controlling for potential confounders.

References

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Multivariate Analysis of Predictors of Pulmonary Embolism and Deep Vein Thrombosis

Variable	Sample Size (Total N= 94,620)	Pulmonary Embolism		Deep Vein Thrombosis	
		Sig. (P-Value)	Odds Ratio	Sig. (P-Value)	Odds Ratio
Corticosteroid Usage for >10 Consecutive Days	5,702	.004	1.468	<.001	1.546
Male	43,731	<.001	1.400	.<.001	1.306
African-American	6,770	.003	1.495	.001	1.420
Hispanic	4,721	.085	.670	.936	.988
Inpatient Status	71,402	<.001	3.779	<.001	2.624
Smoking	20,861	<.001	.649	<.001	.649
BMI >30	34,706	<.001	1.663	<.001	1.595
Age	-	.001	1.011	<.001	1.015
Benign central nervous system tumor	2,693	.002	1.764	.003	1.522
Malignancy	5,707	<.001	1.689	<.001	1.544
Weight Loss (>10% loss of body weight in previous 6 months)	840	.699	.874	.119	1.391
Length of Hospitalization	-	<.001	1.012	<.001	1.015
Emergency Case	5,000	.356	1.150	.001	1.419
Bleeding Disorders	2,494	.523	.875	.382	1.121
ASA physical status >2	45,298	.008	.742	<.001	.597
WBC > 12	8,043	<.001	1.636	<.001	1.459
Surgical-Site Infection	418	.419	1.355	<.001	1.991
Postoperative Sepsis	1,131	.300	1.245	<.001	2.077
Postoperative Septic Shock	419	.024	1.754	<.001	1.953
Postoperative Urinary Tract Infection	1,809	<.001	2.590	<.001	2.276
Wound Dehiscence	246	.022	2.895	<.001	3.148
Post operative pneumonia	1,324	<.001	2.026	<.001	1.635
Ventilator-Dependent Rehabilitation	1,245	.131	.678	.025	1.393
Unplanned Intubation Postoperatively	1,061	<.001	2.407	<.001	2.480
Stroke with Neurological Deficit as Complication	521	.001	2.258	<.001	2.180
CHF, MI, or Cardiac Arrest as Complication	788	<.001	2.474	.004	1.629
Cranial Case	21,841	.092	1.804	.036	1.647
Spine Case	70,770	.626	1.184	.873	1.039
Diabetes Mellitus	14,046	.005	.704	.180	.892
History of Severe COPD	4,059	.212	1.241	.920	1.014
Postoperative Coma >24 Hours	147	.552	1.376	.116	1.857